

# WINGS

SUMMER 2021  
VOLUME 73 NO.4

CLASSIC HORNET  
THE END OF AN ERA

**DANGER ZONES**  
AIR FORCE IN THE  
WAR ON TERROR

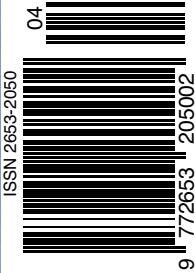
WILLIAMTOWN  
OUR FAST-JET BASE

TUNNEL VISION  
TESTING FIGHTER  
AIRCRAFT IN A LAB



AIR FORCE ASSOCIATION MAGAZINE

AUS \$14.95 (Incl. GST)



ISSN 2653-2050

04

9 772653 205002



**Defence  
Bank**

[defencebank.com.au](http://defencebank.com.au)  
1800 033 139

# Special edition

## AF100 Visa Debit card.

To celebrate the 100 Year Anniversary of the Royal Australian Air Force, we have launched our special edition Defence Bank AF100 Visa Debit card.

Scan the QR code or visit our website for full details.





## ON THE COVER

A menacing view of a thoroughbred fighter – a No.77 Squadron F/A-18A Hornet. Photo: CPL David Said.

## WINGS TEAM

**WINGS MANAGER** Ron Haack

**EDITOR** Sandy McPhie

**ART DIRECTOR** Katie Monin

**SENIOR ADVERTISING EXECUTIVE**

Sue Guymer

**ADVERTISING EXECUTIVE** Phil Whiteman

**ASSISTANT EDITORS**

Mike Nelmes (history)

John Kindler AO AFC (industry news)

Bob Treloar AO MiD (military aviation)

## CONTACT

**E** wingsmanager@raafapublications.org.au

**W** wingsmagazine.org

**A** RAAFANSW Publications Pty Ltd

Salamander Bay LPO, PO Box 656

Salamander Bay 2317

**PRINTED BY:** WHO Printing, Regional Printer of the Year, National Print Awards 2020.

## SUBSCRIPTION

To subscribe for a print copy in the mail or online access go to wingsmagazine.org

## FACEBOOK

Wings on Facebook, go to facebook.com/

WingsMagazineRAAFAPublications

## DISCLAIMER

Information in the articles in this magazine was current at time of publication but more recent developments should be checked with the relevant Defence and other authorities for currency and any changes to conditions. Content appearing in this publication does not necessarily reflect the views or have the endorsement of the Department of Defence or the publisher. While every effort has been made to ensure accuracy and currency in the articles presented, reliance should not be placed on the information contained without reference to the relevant authorities. No part of this magazine may be reproduced without the written consent of RAAFANSW Publications. No responsibility is accepted by the publisher for the accuracy of advertisements or information.



AIR FORCE ASSOCIATION



# CONTENTS

WINGS SUMMER 2021 VOLUME 73/NO.4

- 4 **WELCOME MESSAGES**
- 6 **MILITARY AVIATION**
- 12 **PRESIDENT'S CORNER & ASSOCIATION NEWS**
- 16 **INDUSTRY NEWS**
- 22 **THE GLOBAL WAR ON TERROR**  
RAAF history, part 4
- 28 **PRELUDE TO A FIFTH-GENERATION AIR FORCE**  
The F/A-18 Classic Hornet
- 38 **CENTREFOLD**  
Pull out and keep
- 40 **OUR LARGEST FAST-JET BASE**  
RAAF Williamtown
- 47 **PROPELLER-DRIVEN DESIGNS**  
Lockheed's Skunk Works, part 5
- 52 **STARS, SEXTANTS AND SECOND HANDS**  
Air Force centenary watches
- 55 **100SQN FLIES AGAIN**  
RAAF's heritage flying squadron
- 58 **EDWARDS VC**  
A distinguished career
- 60 **AGAINST THE WIND**  
Aerodynamic testing
- 63 **COLLABORATION EXPANDS TUNNEL VISION**  
DSTG's new imaging capability
- 65 **WHAT GOES AROUND...**  
Recycling carbon fibre
- 66 **PERSONAL FINANCE**
- 67 **CADETS NEWS**
- 72 **LAST FLIGHT**
- 74 **BOOK REVIEWS**



# MESSAGE FROM THE GOVERNOR OF NSW

**T**HERE IS A SAYING IN BUSINESS: 'timing is everything'. The Royal Australian Air Force has always known that. Indeed, it is captured in the RAAF's Centenary Year theme 'Then. Now. Always' and was on display on the occasion of the magnificent centenary commemoration held at the ANZAC Memorial, Hyde Park, Sydney on 26 March 2021, which also marked the 101st anniversary of the formation of the Air Force Association.

The spectacular flypast of the four RAAF PC-21 aircraft from No.4 Squadron Williamtown was coordinated and delivered to the TOT, for the coincident parade and address. Piloting on the left-hand side of the overflying diamond was Flight Lieutenant Mike Keaney, Government House Aide-de-Camp. This was a moving anniversary tribute, linking service of the past to the present.

The rededication of the NSW book of remembrance, *They Gave Their Lives*, was a solemn and dignified reminder of the cost of war. It was also an occasion of deep significance for my immediate and extended family, as it contains the calligraphed name of my uncle, Alan Osborne Beazley, Flight Sergeant of 466 Squadron who was just 19 when his Halifax collided with another 466 aircraft over Germany on 25 July 1944. His is just one name among the 3,978 RAAF NSW personnel who made the ultimate sacrifice in World War II, now honoured in the book which is on permanent display at the ANZAC Memorial. We will remember them.

In June, Government House was delighted to host its own tribute to the RAAF during the traditional ceremonial parade to mark the Queen's Birthday celebrations. After several days of rain, the sun came out to mark the official 95th birthday of Her Majesty. Not so in Temora, where heavy fog thwarted plans for the RAAF's Lockheed Hudson flypast. Ironically, the day before, our pilots had escaped Melbourne's snap lockdown. We hope to see the 1939 Lockheed Hudson, the only one of its kind still flying from service at the

Battle of Milne Bay in World War II and still in its original colours, in action during future commemorations.

Notwithstanding the absence of that special aerial component, the parade ground and its surrounds were a celebration of Air Force. Forty-eight crisply uniformed young men and women formed the Royal Guard, drawn from 3 Wing Australian Air Force Cadets (AAFC) from the Sydney region. They provided an outstanding tribute to both the centenary of the RAAF and the 80th anniversary of the AAFC.

For the first time in history, the RAAF Ensign was proudly flown from Government House as the band on parade played, which also featured 28 talented young musicians from the AAFC. The day was a wonderful connection, linking RAAF's history, its personnel and its cadets: Then. Now. Always.

The following day, RAAF's jazz band performed at Government House's open day delighting over 500 members of the public, as they have on numerous occasions during performances at Music@TheHouse, 'always' giving cause for applause and acclaim. We look forward to hearing RAAF's musicians at the house in 2022, including the fabulous jazz band when our monthly Jazz Sundays resume. They are free and

open to the public, so you must join us on one of these Sundays: the best music in town at the best location!

As I said at the beginning, 'timing is everything'. Within two weeks of the Queen's Birthday celebrations, Greater Sydney was in lockdown. But RAAF and its cadets had delivered to the TOT.

As with Her Majesty's reign, the story of the RAAF is one of service and tradition of which we, as a community, are rightly proud. Congratulations, Royal Australian Air Force on your centenary year. The memories you have created in your celebrations will live on for future generations. Thank you for providing outstanding service to our nation and our State – and to Government House, Sydney, over the past 100 years.

*Her Excellency the Honourable  
Margaret Beazley AC QC  
Governor of New South Wales  
Honorary Air Commodore of the  
Australian Flying Corps and Air Force  
Association (New South Wales Division)*



ABOVE RAAF Queen's Birthday Parade at NSW Government House.



Her Excellency at the Queen's Birthday Parade.

## MANAGING DIRECTOR'S MESSAGE

RAAFANSW Publications Pty Ltd formed in October 2014 following RAAF Williamstown's request to publish a base newspaper. Our original volunteer board had no knowledge about publishing periodicals, but with the essentials gleaned from salaried staff and some 'grey-beard cunning and experience' we managed to survive and in September 2018, the Air Force Association board took what appeared to some as a courageous decision to ask us to publish its iconic *Wings* magazine.

From our first edition, Winter 2019, we set out to transform *Wings* from an ordinary members' magazine into a high-quality aviation publication, the objective being to promote both the Association and the RAAF to members of the public. With a growing list of subscribers and accolades influencing our recent venture into retail sales, I believe we're well on the way to achieving that goal.

Unsurprisingly, our success has not been achieved by accident. We were most fortunate to recruit a highly qualified and motivated volunteer to be our *Wings* manager. He is supported by our experienced professional editor, our talented designer, our dedicated advertising executives, and an impressive editorial team comprising two retired air-rank officers, a dedicated aviation historian, a financial expert and a leadership coach, all of whom contribute in their specialisations to generate the quality outcome.

A number of other loyal supporters and board members take on the less glamorous but essential functions that include administration, accounting, distribution, and website and Facebook management. I and the AFA are deeply indebted to them and our growing number of sponsors and regular advertisers for their ongoing loyalty and support. I'm sure they all join me in wishing readers a merry Christmas and a happy new year.

*Neil Smith AM,  
MBE Air Vice Marshal (retired)  
Managing Director, RAAFANSW  
Publications Pty Ltd*

## MANAGER'S MESSAGE

Our cover story pays tribute to the Classic Hornet that will cease flying in Australia this December. From selection to disposal, the Hornet has been a resounding success; a true multi-role asset with genuine warfighting capabilities in all arenas. I first flew the Hornet in May 1984 and I'm sure I share a tinge of remorse with all who worked with the aircraft as we say farewell to a trusted steed after some 37 years.

We have included a couple of gift cards in this edition (turn to the centre of the magazine, following page 38), one for Christmas and one for simply the joy of giving. Please take advantage of the offer to promote Australia's aviation heritage and the nations' progress in future aerospace enterprises.

Despite my assurance that we would conclude the Qantas history this

edition, I failed to accurately merge the authors training commitments with our publication timeline. The final chapter of the Qantas story will now be published in Autumn 2022.

*Ron Haack  
Wings magazine manager*

• *If you have something you'd like to share with other readers, please send it to [editor@raafapublications.org.au](mailto:editor@raafapublications.org.au), including your name and details. Letters may be edited for length and clarity.*

## THE AUSTRALIAN AIR FORCE ASSOCIATION

### NATIONAL PRESIDENT

Carl Schiller OAM, CSM

### NATIONAL VICE PRESIDENT

Peter McDermott AM, CSC

### NATIONAL SECRETARY

Peter Colliver OAM [natsec@raafa.org.au](mailto:natsec@raafa.org.au)

### NATIONAL TREASURER

Robbie Robertson

## JOIN THE AIR FORCE ASSOCIATION

To join the Association, visit [raafa.org](http://raafa.org) and follow the JOIN US link.

For assistance, contact the Association by phone or email. See page 13 for contact details.

- WOULD YOU LIKE TO ADVERTISE YOUR BUSINESS IN -

# WINGS



PLEASE CONTACT PHIL WHITEMAN  
0434 524 473 / [philwhiteman\\_media@outlook.com](mailto:philwhiteman_media@outlook.com)



EDITED BY Bob Treloar

# Evacuation of AFGHANISTAN

**IN AUGUST**, a fleet of two RAAF C-17A Globemaster aircraft, two C-130J Hercules aircraft and a KC-30 Multirole Tanker Transport aircraft were deployed in support of Australian and coalition evacuation operations from Afghanistan. The final flight from Hamid Karzai International Airport in Kabul, Afghanistan to Australia's main operating base in the Middle East region was completed on 26 August.

About 1,200 Australian citizens, Afghans with Australian visas and other foreigners were evacuated, taking the total to about 4,000 people rescued – more than three times the number anticipated. The efforts to get thousands of people out succeeded despite the Taliban establishing armed checkpoints outside of the airport as tens of thousands tried to flee the country.



**ABOVE** Evacuees onboard a RAAF C-17A Globemaster II. Photo: SGT Glen McCarthy.

## Message from Chief of Air Force

**AIR FORCE FAMILY**, I echo the words of the Chief of Defence Force in describing the uncertainty and concerns arising from the deteriorating security situation in Afghanistan.

I have also drawn some inspiration from the words in a letter sent to me by one of our corporals. She had attached a message from a friend of hers that truly moved me.

Our thoughts are not only with the people of Afghanistan during these difficult times, but with our own members, who served so gallantly with distinction, sometimes at great cost, but in the cause of aiding people who had lost hope. Importantly, what you did, was show that hope for the future was real while simultaneously protecting the people of Afghanistan. Legacies that will resonate with a generation of Afghans to whom, whatever your role, you gave hope, and who now know the benefit of your humanity.

We remain steadfast and will continue to serve our nation when called upon, as we have seen in the latest deployment of our ADF personnel to Afghanistan.

I acknowledge that the latest developments cause concern amongst

many of our members and their families. As you reflect on these latest events, I ask that you do not lose sight of the service and courage of more than 39,000 ADF personnel and Defence civilians who supported and deployed to Afghanistan over the past 20 years. Australians sacrificed much in seeking to protect the lives of Afghans and with our partners and allies did much to secure their peace.

As the Prime Minister has said, Australia has always stepped up in the fight for freedom and stepped up on the values that make us who we are. The ADF fought alongside Coalition and Afghan partners to degrade the capabilities of terrorist organisations; this has helped to protect the safety and security of the Australian people at home.

I continue to be proud of your efforts and the contribution you made, individually and as a team over this time. I know that over the coming months and years, many of you will continue to support the Afghan people who will join the Australian community. You have, and you continue to leave a legacy, that is in the finest traditions of the ADF.

I thank you for your service and sacrifice in support of the mission in Afghanistan. I acknowledge the sacrifice made by the families of those who have served. ADF families play a vital role in supporting our ability to serve the nation. For this we thank you.

I ask you to look after each other and your families and encourage you to seek out help, if you need, from any of the multiple avenues and support mechanisms available.

**Air Marshal Mel Hupfeld**  
Chief of Air Force



**BELOW** Afghan families line up behind the RAAF C-17A Globemaster while ADF personnel provide security prior to departing Hamid Karzai International Airport. Photo: SGT Glen McCarthy.



# US Bomber's LONG HAUL

**AS PART OF** Exercise Talisman Sabre 2021 (TS21), a US Air Force B-52 Stratofortress aircraft from the 69th Expeditionary Bomb Squadron launched before dawn from Andersen Air Force Base, Guam, and flew several thousand kilometres to conduct bombing runs on a variety of nominal targets in Australia guided by US and Australian forces.

The B-52H, a long-range, heavy bomber, has been the foundation of the USAF Global

Strike bomber triad for more than 60 years.

Exercise Talisman Sabre, the largest bilateral training activity between Australia and the US, is held every two years to test Australian interoperability with the US and other participating forces in complex warfighting scenarios. This year more than 17,000 troops from the US, Australia and five other partner nations – Japan, Canada, South Korea, the United Kingdom and New Zealand – participated in Talisman Sabre from 14-31 July.



**RIGHT** An EA-18G Growler from No.6 Squadron, a No.1 Squadron F/A-18F Super Hornet and an F-35A Lightning aircraft from No.3 Squadron fly alongside a USAF B-52H Stratofortress during Exercise Talisman Sabre 2021.



## Extending our reach across oceans



USAF, Pacific Air Force's KC-135 Stratotanker aircraft refuels a KC-10 Extender aircraft during the ferry of No.6 Squadron EA-18G Growlers to the US. Photo: FLTLT Antonia Flocco.

**US AIR FORCE** (USAF) KC-10 Extender and KC-135 Stratotanker aircraft provided air-to-air refuelling support to RAAF EA-18G Growlers during the second leg of their journey to Alaska to participate in joint exercises. The USAF tankers provided a total of 164,000-pounds (93,000L) of fuel to the Growlers over the eight-hour, 6,000km flight from Andersen Air Force Base, Guam, to Hickam Air Force Base, Hawaii.

The support demonstrated the flexible integration between Australian and US assets to deploy combat air power rapidly across the Pacific when required.

Exercise Distant Frontier was conducted at Eielson Air Force Base, Alaska, between 26 July and 6 August to provide unit-specific training ahead of Red Flag Alaska 21-3.

*Source: Department of Defence*

## Your brand new destination for the moments that matter

**Holiday Inn Werribee** is the uplifting new hotel that helps you connect with what matters most. Choose from 150 stylish new rooms and enjoy our onsite restaurant Rosana Bistro + Bar.

**Holiday Inn**

AN IHG HOTEL  
WERRIBEE



**20 MINUTES FROM AVALON AIRPORT. 10 MINUTES FROM RAAF BASE POINT COOK & RAAF LAVERTON BASE.**

22 Synnot Street, Werribee VIC 3030 | [hiwerribee.com.au](http://hiwerribee.com.au) | [sales.melws@ihg.com](mailto:sales.melws@ihg.com) | **03 8731 3030**



**AUSTRALIA'S LATEST F-35A** Lightning II aircraft to roll off the Lockheed Martin production line in Texas headed straight to Alaska to participate in Exercise Red Flag Alaska 21-3 in August.

In a complex logistical, contracting and engineering effort, aircraft A35-038 to A35-041 were delivered to Eielson Air Force Base (AFB) in Alaska rather than Luke AFB in Arizona, the normal launch base for ferry to Australia.

The four aircraft were delivered, contractually accepted, added to the Defence Register and issued a flight clearance in a short timeframe, requiring support from several agencies, including the Joint Strike Fighter Branch, Air Combat Systems Program Office, Airworthiness Coordination and Policy Agency, Defence Aviation Safety Authority and No.81 Wing.

Adding to the complexity, the aircraft were required at Eielson AFB in time to allow No.3 Squadron technicians to install

the latest and most advanced F-35A software which improves a range of vehicle systems and adds new mission and weapon capabilities.

Red Flag Alaska is a Pacific Air Forces-sponsored exercise designed to provide realistic training in a simulated environment over the Joint Pacific Alaska Range Complex. The surface-to-air and air-to-air threat environment provided in the Alaskan environment is unique. The US 18th Aggressors Squadron and 353rd Combat Training Squadron provided 'enemy' assets and tactics and provided intense and realistic combat exposure to all allied participants and in particular fifth-generation aircraft.

Source: *Air Force News*



**ABOVE** The latest four RAAF F-35A Lightning II aircraft to roll off the Lockheed Martin production line headed straight to Alaska.

## US test fires anti-radiation MISSILE

**THE US NAVY** has completed the first live fire of Northrop Grumman's AGM-88G Advanced Anti-Radiation Guided Missile Extended Range (AARGM-ER) from a F/A-18E Super Hornet at the Point Mugu Sea Range off the coast of southern California.

"The AARGM-ER was successfully launched from the F/A-18 and met the key test objectives of a first missile live fire event," Captain A.C. Dutko, Navy Program Manager for Direct Time Sensitive Strike Projects said. "The government and industry team had great focus and were able to conduct this test event three months earlier than originally envisioned."

AARGM-ER is set to be integrated on the USN F/A-18E/F Super Hornet and EA-18G Growler fleets, and eventually the USAF and USMC suite of F-35 strike fighters.

Source: *Defence Connect*



**BELOW** F/A-18E loaded with an AGM-88G anti-radiation missile.



## 70th anniversary of ANZUS Treaty

**THE ANZUS TREATY** is 70 years old. Designed to protect security in the Pacific in the wake of World War II, it was signed on 1 September 1951.

The Australia-United States relationship, underpinned by ANZUS, is now focused on the Indo-Pacific, and a key component is force-posture cooperation with the US, including the Marine Rotational Force – Darwin.

Now in its 10th year, the US Force Posture Initiatives are intended to improve interoperability between Australian and US armed forces, provide opportunities to engage with partners in the Indo-Pacific, promote regional stability, and better posture both nations to respond to conflict and contingencies such as humanitarian assistance and disaster-relief operations.

Source: *Department of Defence*





A Boeing F/AESA-37 fighter jet is shown in flight, banking to the right. The aircraft is dark blue with orange accents on the nose, wingtips, and tail. It features a canards configuration and a stealthy design. The background is a vast, rugged landscape with rolling hills and a winding river, captured from an aerial perspective. The lighting suggests a sunset or sunrise, with warm tones across the terrain.

# HONOURING 100 YEARS OF THE ROYAL AUSTRALIAN AIR FORCE

Founded in values of service, courage, respect, integrity and excellence, the Royal Australian Air Force (RAAF) has been defending the people of Australia for the last century. Since 1927, Boeing and the RAAF have partnered to create next-generation products and push the boundaries of air defence. Boeing also proudly welcomes RAAF veterans into our workforce, where they continue to support Australia's defence. As enduring partners, we recognize the centenary of the RAAF and we look forward to many more years of partnership, innovation and protection.

[boeing.com.au](http://boeing.com.au)



# ANTARCTIC DELIVERIES



**RAAF C-17A GLOBEMASTER III** aircraft have delivered five Challenger and three Pathfinder snow groomers, weighing between seven and 32 tonnes each, to the Australian Antarctic Division during the past two summers as part of Operation Southern Discovery.

The snow vehicles will be used to travel 1,200km into the Antarctic interior to obtain million-year-old ice-core samples. Scientists are expected to spend four or five summers drilling 3km into the ice cap to collect the samples. The chemical composition of the ice will reveal information about past temperatures, snowfall, volcanic events and solar variations. Air bubbles trapped in the ice directly record past changes in atmospheric composition, including concentrations of carbon dioxide and other greenhouse gasses. The aim is to unravel details about the natural drivers of the Earth's ice-age cycles and better predict how the ice sheet may evolve in the future.



**RAAF C-17A Globemaster III at Wilkins Aerodrome, Antarctica during Operation Southern Discovery.**  
Photo: Michael Wright.

## Forces combine for live-fire mission

**THE ADF AND** the US Marine Rotational Force – Darwin (MRF-D) conducted a rapid-insertion long-range fire mission at Bradshaw Field Training Area, 350km south of Darwin in August.

As part of Exercise Looby, more than 100 US Marine Corps (USMC) personnel deployed in four MV-22B Osprey tilt-rotor aircraft to secure Nackaroo Airfield before a RAAF Boeing C-17A Globemaster III touched down on the short dirt runway to insert a USMC M142 High Mobility Artillery Rocket System (HIMARS).

The rapid insertion of the HIMARS enabled a successful missile strike on a simulated anti-ship missile battery target.

The bilateral activity demonstrated increasing interoperability between ADF and US forces with the ability to project joint capability into the region.

US marines cleared the airfield of enemy threats, while the Australian Army managed ground-based air defence. During the C-17A flight, the HIMARS platform was connected to the in-flight navigation system for the first time, so that the moment it rolled down the ramp, it was ready to fire.

Source: Department of Defence



**RIGHT** A US Marine Corps High Mobility Artillery Rocket System is offloaded from a RAAF C-17 Globemaster III as part of Exercise Looby. Photo: CAPT Carla Armenti.



**BELOW** RAAF C-27J Spartan delivers humanitarian stores to assist Papua New Guinea in its fight against COVID-19. Photo: WGCDR Tim Shaw.



## SPARTAN'S redefined roll

**DEFENCE IS ENHANCING** support for humanitarian disaster relief, crisis response and regional engagements by redefining the role of the C-27J Spartan aircraft.

"The Spartan demonstrated its specific capabilities during the 2019/20 Australian bushfire crisis by safely evacuating 2,400 fire-affected community members and resupplying remote communities that were inaccessible by larger aircraft, which included moving 300,000kg of cargo," said Chief of Air Force, Air Marshal Hupfeld.

"The Spartan conducted those missions at a range that exceeded the ability of Defence helicopters."

Originally acquired for battlefield airlift, the Spartan is now being referred to more broadly as a light tactical fixed-wing aircraft.

The first of 10 RAAF C-27Js arrived in Australia in 2015, however, after six years in service the aircraft still has not achieved Final Operational Capability, which is now not expected until the end of the 2021/2022 financial year.

Meanwhile, Defence has received the first two of four additional CH-47F Chinook helicopters which perform a similar battlefield lift capability to the C-27J. The extra Chinooks acquired from the US Government will bring the fleet to 14 helicopters.

Source: Department of Defence



Leading Aircraftwoman Natasha Johnson, from No.35 Squadron, with locals.

## CELEBRATING INDEPENDENCE DAY

**AVIATORS FROM AIR FORCE'S** No.35 Squadron joined the community in Port Vila for Vanuatu Independence Day celebrations while on fisheries surveillance operations.

From 9 July to 6 August, a C-27J Spartan and 14 members of the squadron deployed to Port Vila for Operation Solania, one of four Forum Fishery Agency (FFA) annual maritime surveillance operations. Designed to detect and deter potential illegal fishing activity and vessels, the operation is conducted in partnership with South-West Pacific nations, including Vanuatu, Fiji, Solomon Islands, Palau and Tuvalu.

RAAF crews obtain high-resolution imagery of ships and vessels of interest and provide the surveillance information to the FFA. During the latest deployment, which coincided with Vanuatu's 41st Independence Day, No.35 Squadron identified 61 ships, and five were vessels of interest to authorities.

The C-27J provided a flypast of Port Vila's Independence Park as a contribution to the celebrations.

## Putting safety first

**AFTER HEAD STRIKE** incidents reached an average of two a month last year, Growler maintainers at No.6 Squadron were asked to help come up with a solution.

Squadron members requested lightweight helmets that looked cool and weren't cumbersome. Cost, effectiveness, durability, availability and comfort were also of concern. The material had to be suitable for working with fuel, chemicals and in varying weather conditions.

The final design was a modification of a low-profile bump cap Boeing technicians have been using for some time. Six months on, there haven't been any strike incidents from maintainers wearing the

caps. An added benefit is that the plastic liner fits into the squadron caps and can also be used inside a beanie or balaclava.

*Source: Department of Defence*



**ABOVE** No.6 Squadron maintenance personnel wearing the new bump caps. Photo: SGT Peter Borys.

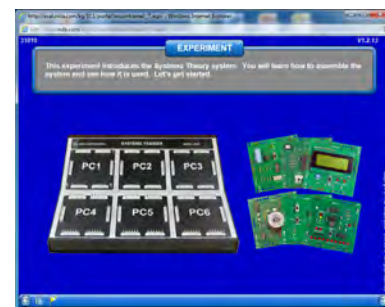


## NIDA AVIONICS TRAINING SYSTEM

### Avionics Troubleshooting Capabilities

Designed for use with 130ST training console, students are introduced to basic troubleshooting experiments involving:

- Aircraft instrumentation
- Aircraft power and aircraft wiring
- Aircraft lighting and engine system
- Avionics data communications
- Basic Aircraft electronics



**Over 3000 hours of online lessons content through LMS**

Contact us for more information

[www.bestech.com.au](http://www.bestech.com.au)

**BESTECH**  
Sensors & Teaching Equipment



03 9540 5100 | [enquiry@bestech.com.au](mailto:enquiry@bestech.com.au)  
Unit 14/ 44 Garden Boulevard,  
Dingley VIC 3172

# PRESIDENT'S DESK

**I FEEL CERTAIN** many Vietnam War veterans empathise with our Australian Defence Force (ADF) Afghanistan veterans and the families who supported them during their tours of duty. The recent images of men, women and children jostling to escape the Taliban at Hamid Karzai International Airport are a poignant reminder of the evacuation of Saigon in 1975, when the North Vietnamese and Viet Cong forces conducted their final assault on the city.

We can understand if Afghanistan veterans feel their efforts have been in vain. Forty-one families have lost a loved one, while others live with veterans who have suffered or continue to suffer from a range of serious health issues. Australian servicemen and women served to provide the Afghan people protection, security force training, improved infrastructure, and a range of humanitarian support. It is likely all Afghanistan veterans will shoulder disappointment for the country they supported to achieve a peaceful and happy life for its people. Their service was exemplary, and they should be very proud



of their accomplishments. Despite the political outcome in Afghanistan, you would hope the new Taliban-based administration would be more moderate than its previous administrators two decades ago, and that the Taliban has learnt that harbouring terrorist organisations has serious repercussions. Twenty years of Coalition presence would have influenced the thinking of a generation of Afghans, especially young females who were deeply suppressed by earlier regimes, to be less accepting of repressive rule. Hopefully, as a result of that experience, the future of the Afghan people will be brighter as it is for the South Vietnamese people.

The ADF's evacuation of fleeing Afghan nationals, including those who supported the Coalition during the conflict, was part of the largest humanitarian airlift operation in recent history. It was an extremely hazardous activity over nine sweltering days last August. The mission would have been a harrowing time for those involved and their families and loved ones waiting anxiously for their safe return. The evacuation mission is an example of the

unique nature of military service. The Air Force Association 'raises a glass' to all Afghanistan veterans and their families. They are part of the Australian story.

For many of us, 2021 for a variety of reasons has been a disappointing time. However, I am pleased to say the Association has kept busy progressing several initiatives. The major focus is on its National Veteran and Family Homeless Recovery Program that involves providing short to medium-term emergency and transition accommodation. The Western Australia Division has a pilot program underway and the Victoria Division is developing a veteran and family homeless business plan. It is likely other Divisions will opt-in to the program when traction has been achieved.

Although the best acquired veteran homelessness data indicates Air Force veteran homelessness is the lowest of all Australian veterans, the Association's initiative will support veterans of any service origin. I will keep you posted on the initiative's progress.

We are aware of the COVID situation in the country and its impact on our mental health. I encourage you to reach out to your friends and families to check on their wellbeing. Personal contact over the phone or by email, although not ideal, can be uplifting especially for those living alone.

Keep safe and well.

*Carl Schiller OAM, CSM  
National President*

## SUBSCRIBE TO WINGS

The Perfect Gift for Christmas and Special Occasions.

Look for the gift cards in the centre pages.

AIR FORCE ASSOCIATION



A voice to government for  
members and ex-members

An association for all ranks

Open to citizens with a strong  
aviation interest

*WINGS* magazine provided  
free to members



# Air Force Association

Supporting veterans | Fostering friendships | Honouring our legacy

## NEW SOUTH WALES

Air Force Association (NSW Division)  
PO Box 494,  
Paddington NSW 2021  
Tel: 0418 627 969 | [secretary@raafansw.org.au](mailto:secretary@raafansw.org.au)  
[www.raafansw.org.au](http://www.raafansw.org.au)

## AUSTRALIAN CAPITAL TERRITORY

RAAF Association (ACT Division)  
PO Box 111,  
CAMPBELL ACT 2612  
Tel: 0428 622105 | [secactraafa@bigpond.com](mailto:secactraafa@bigpond.com)  
[www.raafact.org.au](http://www.raafact.org.au)

## VICTORIA

Air Force Association (Victoria Division)  
24 Camberwell Rd, EAST HAWTHORN VIC 3123  
Tel: 03 9813 4600 | [office@afavic.org.au](mailto:office@afavic.org.au)  
[www.raafavic.org.au](http://www.raafavic.org.au)

## QUEENSLAND

RAAF Association (QLD Division)  
PO Box 2259, WELLINGTON POINT QLD 4160  
Mob: 0419 688 014 | [statesec@raafaqlld.org](mailto:statesec@raafaqlld.org)  
[www.raafaqlld.com](http://www.raafaqlld.com)

## SOUTH AUSTRALIA

RAAF Association (SA Division)  
Torrens Parade Ground Victoria Dr, ADELAIDE SA 5000  
Tel: 08 8227 0980 | [raafaad@internode.on.net](mailto:raafaad@internode.on.net)  
[www.raafasa.org.au](http://www.raafasa.org.au)

## WESTERN AUSTRALIA

RAAF Association (WA Division)  
18 Bowman St,  
SOUTH PERTH WA 6151  
Tel: 08 9288 8400 | [enquiries@raafawa.org.au](mailto:enquiries@raafawa.org.au)  
[www.raafawa.org.au](http://www.raafawa.org.au)

## TASMANIA

RAAF Association (TAS Division)  
RAAF Memorial Centre,  
61 Davey St, HOBART 7000  
Tel: 03 6200 9221 | [secretary@raafatas.org.au](mailto:secretary@raafatas.org.au)  
[www.raafatas.com](http://www.raafatas.com)

# WINGS – FROM THEN TO NOW

**WINGS HAS BEEN** the principal organ of the Air Force Association for 75 years. Previously it had been the official magazine of the Royal Australian Air Force. It was first published on 13 April 1943 – right in the middle of WWII and when Australia had become a critical player in the war in the Pacific. Although its objective was to boost the morale of some 144,000 Australian airmen and women in RAAF service, its message then wasn't too different to that of *Wings* today. *Wings* is about boosting the sense of connection and wellbeing of its readers, particularly serving and former serving aviators.

The wartime *Wings* was published fortnightly by the then RAAF Directorate of Public Relations. It incorporated the RAAF's former journal, *Air Force News*, that ironically was founded by an Australian Army officer, Major R.B. Leonard. *Wings* was free but the weekly *Air Force News* had been sold, with its profit providing a funding stream for RAAF Welfare.

## ‘And when the ops are over – where are you going to land?’

Unsurprisingly, the wartime *Wings* focused on the war effort. An editorial comment in its first edition clearly outlined the magazine's objective: “to serve those who are serving in so many ways to give us victory through wings; such is this journal's mission and the meaning of its name”.

The then Minister for Air, Arthur S. Drakeford also commented: “If it achieves

its objectives *Wings* will have made a considerable contribution to the war effort by keeping members abreast of the times and helping to rout the boredom of service life on remote stations, thus enabling all to bring to the solution of their problems an entirely fresh and untarnished outlook”.

Chief of Air Staff in 1943, Air Vice-Marshal George Jones wrote: “I consider *Wings* aims to portray some of the many activities of a fighting service, whose reputation is founded on the magnificent spirit of co-operation and sacrifice of its individual members, and which will go down in history as one of the finest fighting units any nation has yet produced”.

Unlike the glossy, high-quality current version of *Wings*, the wartime magazine was low budget, essentially black and white, and with limited pictorial colour on comic-book-style paper that was common in the late 1940s through to the 1960s. Despite its austere appearance, *Wings* was a sort-after magazine and the limited copies produced had to be

shared. *Wings* was inclusive; articles on the WAAAF, ATC, operations, safety, maintenance and human-interest stories were commonplace. It is interesting to note that some things don't change. The first edition contained an article titled ‘And when ‘ops’ are over – where are you going to land?’. Transition from service to civilian life was a concern then as it is today.

Wartime *Wings* continued to be



**ABOVE** Enjoying a good read. Photo: Australian War Memorial.

published until war's end. It achieved its objectives of boosting morale and meeting the interests of all ranks equally and presenting all facets of Air Force life.

In 1946, the magazine was passed to the Air Force Association. Over the subsequent 75 years, *Wings* has continued to evolve, with changes in publishers, presentation and content. Today, *Wings* looks and feels quite different to the first issue.

It is currently published by RAAFANSW Publications Pty Ltd for the Air Force Association with the goal of reinvigorating the magazine and increasing its appeal to a wider audience. As a result, *Wings* has transitioned into a quality, coffee-table-style magazine with a broad appeal not only to those who served, but to anyone with an interest in aviation.

Most recently, in recognition of their long and historic relationship, Air Force and the Air Force Association have committed to join forces once again on *Wings* magazine. The important step affords Air Force the opportunity to contribute valuable veteran-related articles, especially those concerning transition and ongoing support.

In coming this full circle, *Wings* magazine has become the go-to publication not only for aviation enthusiasts but for our serving and former serving veterans.



GO BEYOND

**F135**

# UNRIVALED PERFORMANCE. UNPARALLELED VALUE.

**POWERING THE F-35 TO STAY AHEAD OF ANY THREAT – AND COMPLETE EVERY MISSION.**

An engineering marvel built upon 95+ years of experience, Pratt & Whitney's F135 engine is the pinnacle of combat propulsion. With its adaptive, maintenance-friendly design, unmatched dependability, and 5th Generation technologies, the F135 enables the F-35 to go places other aircraft cannot.

EXPLORE THE CAPABILITIES OF THE F135 AT [PRATTWHITNEY.COM](http://PRATTWHITNEY.COM)



EDITED BY John Kindler

# TAE Aerospace F-35 MILESTONE



An F135 suspended in the TAE Aerospace MRO&U facility at Bundamba, Qld.

**TAE AEROSPACE HAS** confirmed it has achieved Initial Depot Capability requirements for the repair of the Pratt & Whitney F135 engine fan and power modules, used in all three variants of the Lockheed Martin-built F-35 Lightning II fighter aircraft. TAE Aerospace's F135 maintenance, repair, overhaul and upgrade (MRO&U) facility in Australia is the first operational F135 engine depot in the Asia-Pacific region and has begun providing repair services for jets under the F-35's Global Support System.

The firm achieved the capability milestone after completing a full rebuild of an F135 power module at its Queensland facility, which followed fan module repair qualification in 2020.

"We congratulate the TAE Aerospace team on reaching the critical sustainment milestone for the F135 engine," said O Sung Kwon, vice president, Pratt & Whitney Military Engines Sustainment Operations. "The activation of the Australia depot will bring increased capacity to the global F135 MRO&U network in support of the growing fleet."

Source: Defence Connect

## Defence names finalists for AIR 6500 contract

**LOCKHEED MARTIN AUSTRALIA** and Northrop Grumman Australia are finalists in the race to deliver a sovereign next-generation Joint Air Battle Management System (JABMS) to the ADF under the government's \$2.7 billion AIR 6500 Phase 1 project. The firms are in the running to lead the development of capability designed to bolster situational awareness of air and missile threats, while also enhancing interoperability between partner nations.

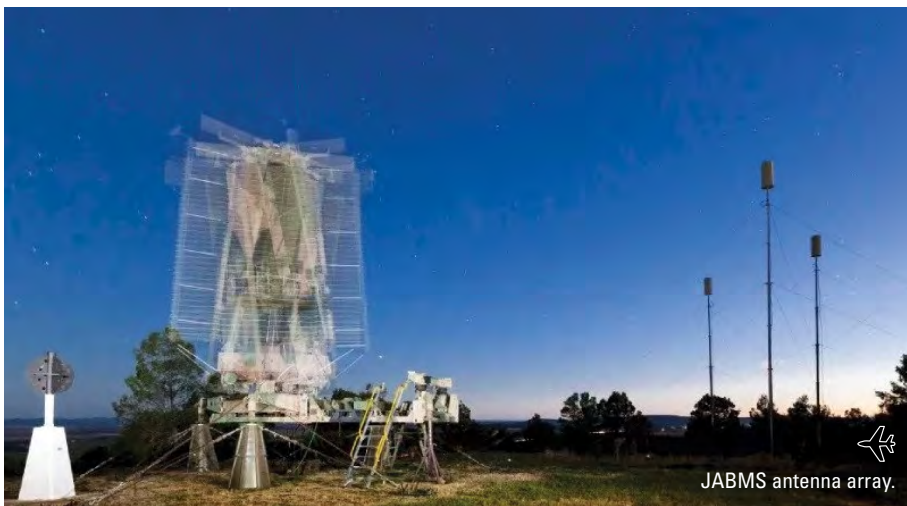
Boeing Defence Australia and Raytheon Australia, who participated in the first phase of the competitive evaluation process, have fallen short but are expected to continue offering support for the program. Lockheed Martin and Northrop

Grumman will continue engaging with Defence and local industry partners ahead of a government decision in 2023.

Reflecting on the interoperability benefits of the next-generation JABMS, Steve Froelich, Lockheed Martin Australia AIR 6500 program executive, said: "AIR 6500-1

will make it possible to combine Australia's integrated battlespace with the US and allied forces, ensuring greater situational awareness and increased interoperability for our military forces to combat evolving threats across the region."

Source: Defence Connect



JABMS antenna array.





## US AIR FORCE VISTA UPGRADE

**THE NF-16D** Variable In-flight Simulator Aircraft (VISTA), configured as a training platform for the US Air Force Test Pilot School, has been redesignated as the X-62A and is being upgraded with a new system for autonomous control of simulation to support autonomy testing for the US Air Force (USAF) Research Laboratory's Skyborg program.

Skyborg aims to enable the USAF to operate low-cost, unmanned aircraft that accompany manned fighters. It will prototype autonomous and unmanned technologies to support a range of missions.

The VISTA, operated by the USAF Test Pilot School with the support of Calspan and Lockheed Martin, first flew in 1992. It has provided students the ability to experience a range of stability and control characteristics and the associated handling and performance qualities representing a variety of flight control system design objectives.

Source: [aerospacetestinginternational.com](http://aerospacetestinginternational.com)



**ABOVE** F-16 VISTA test platform.

## C4i acquired by FREQUENTIS

**FREQUENTIS HAS COMPLETED** its acquisition of C4i, a Melbourne-based subsidiary of L3Harris. C4i operates in the defence command and control market and Frequentis will re-establish it as an independent brand, with a focus on US, Australia, UK and allied markets.

In a statement, Frequentis said C4i will strengthen its worldwide defence business and portfolio with its highly secure interoperable communications solutions for mission-critical environments. "We will combine the strength of Frequentis and C4i mission-critical communication platforms, to provide market leading technology and solutions based on extensive security, compliance and export handling processes."

Founded more than 20 years ago, C4i has about 80 employees and most recently generated annual revenue of about US\$17 million (\$23 million). The deal forms part of Frequentis' broader US\$20.1 million acquisition of several L3Harris business units, announced earlier this year.

Source: *Australian Defence Magazine*

## Indonesia re-joins

## KF-21 FIGHTER PROJECT



Artist's impression of the KF-21 Boramae fighter.

**ENGINEERS FROM INDONESIA** are set to re-join the KF-21 Boramae (Young Hawk) multirole fighter aircraft development program led by Korea Aerospace Industries (KAI). The development follows the Indonesia government's decision in April to "reaffirm its continued participation in the joint development", according to South Korea's Defense Acquisition Program Administration (DAPA).

DAPA said 32 Indonesian engineers are preparing to restart work on the KF-21 project with the number expected to grow to about 100 by the end of the year.

A KAI spokesperson told Janes that the returning Indonesian personnel would resume work collaborating with KAI counterparts on KF-21 production and ground and flight test activities.

In 2015, South Korea and Indonesia agreed to invest KRW8.8 trillion (\$10 billion) to develop the KF-21, with Jakarta paying 20 percent of development costs in return for access to technologies.

Source: *Janes*



Tejas demonstration at Aero India 2017.  
Photo: © Venkat Mangudi/flickr.com.



## GE Aviation to power

# INDIAN COMBAT AIRCRAFT

**INDIA'S STATE-OWNED** company Hindustan Aeronautics Limited (HAL) has placed an order with GE Aviation to supply 99 F404-GE-IN20 engines for Tejas (Brilliance) light combat aircraft (LCA). The deal is valued at \$970 million.

HAL chairman and managing director R Madhavan said: "This is the largest ever deal and purchase order placed by HAL for LCA. The company is working closely with GE for its support to pursue the export potential of LCA, and also to supply spares to the global supply chain of GE 404 engines."

The F404-GE-IN20 engine is the highest thrust variant of the F404 family. It features GE's latest hot section material and technologies, as well as full authority digital engine control for reliable power and improved operational characteristics. The F404 family of engines has achieved more than 14 million engine flight hours and powered 15 different types of production and prototype aircraft.

Source: *Airforce Technology*

## BAE expands at Astra Aerolab

**BAE SYSTEMS**, which employs about 5,000 people across Australia, has signed a 34-year extension on its lease at Newcastle Airport, NSW and has also entered into a new pre-commitment for up to 4.4ha of land at the Astra Aerolab defence and aerospace precinct, which offers airside access to RAAF Base Williamtown and the airport.

Under the agreement, Astra Aerolab will provide a full range of property services, including future development of facilities.

Newcastle Airport CEO, Dr Peter Cock said BAE Systems' expansion at Astra Aerolab would propel the development of the world-class aerospace precinct.

"As Australia's premier fast jet base, RAAF Base Williamtown is home to the vast majority of Australia's F-35 Joint Strike Fighters. BAE Systems Australia plays a key sustainment role in the Asia Pacific region for the F-35 program and as such is looking to increase its presence and resources at Williamtown.

"The new footprint will allow the development of a bespoke facility adjacent to its current site that will see a significant expansion of BAE Systems' world-class local workforce."

## Hermeus wins contract for HYPERSONIC SYSTEMS



Artist's impression of the Hermeus Quarterhorse hypersonic testbed.

**THE US AIR FORCE** has awarded Hermeus a US\$60 million jointly funded contract to accelerate the commercial development of hypersonic aircraft and propulsion systems, according to a service statement. Hermeus will validate a proprietary turbine-based combined cycle (TBCC) engine based around the General Electric J85 turbojet propulsion system in a test platform named Quarterhorse. Hermeus is calling Quarterhorse the first in a line of autonomous high-speed aircraft.

Hermeus is aiming to flight test its TBCC engine across the full flight envelope for less than US\$100 million (AU\$133m) by taking a different approach to that used in traditional high-speed flight-test programs. Hermeus will leverage autonomous and reusable systems, "ruthlessly" focused requirements, and a hardware-rich program. It expects to begin Quarterhouse flight testing in late 2022.

Source: *Janes*

C-390 MILLENNIUM

# UNBEATABLE COMBINATION

## OPERATIONAL EFFICIENCY AND LOW LIFECYCLE COSTS.

The C-390 Millennium has been designed to meet the challenges of today's militaries by combining the highest levels of operational efficiency with the lowest life cycle costs in the medium-weight airlifter market. New innovations such as the automated cargo handling and maintenance systems enable the fast loading and unloading of different payloads, while improving safety and reducing time spent on maintenance. Already proven in service with the Brazilian Air Force and, with contracts signed by the Portuguese and Hungarian Air Forces, the C-390 can be relied upon whatever your mission.

#C390UnbeatableCombination  
[embraerds.com](http://embraerds.com)



CHALLENGE.  
CREATE.  
OUTPERFORM.

## Triton takes flight in multi-intelligence mode

**NORTHROP GRUMMAN HAS** confirmed its MQ-4C Triton – a high-altitude, long-endurance maritime intelligence, surveillance and reconnaissance platform – has conducted its maiden flight in a “highly upgraded” multi-intelligence configuration, referred to as integrated functional capability four (IFC-4).

According to Northrop Grumman, IFC-4 would enable the US Navy to retire the Lockheed Martin-built EP-3E Aries fleet by assuming intelligence collection missions. Doug Shaffer, vice president and program manager, Triton programs, said the bolstered platform would “completely revolutionise” maritime patrol and reconnaissance capability of the US Navy and the RAAF.

The US Navy is currently operating two Tritons in the Pacific as part of an early operational capability deployment, expected to achieve initial operational capability in 2023. Australia is expected to receive the first of six to seven Tritons in 2023. Remotely operated out of RAAF Edinburgh, South Australia, Triton will be capable of monitoring 5.2 million square kilometres in a 24-hour mission and flying a round trip from the Northern Territory for sustained surveillance and support of allied freedom of navigation operations in the South China Sea.

*Source: Defence Connect*



**ABOVE** Northrop Grumman MQ-4C Triton ISR platform. Photo: US Navy.



Satellite dish. Photo: Thales Group.

## Optus to lead joint bid FOR MILITARY SATCOM

**SATELLITE OWNER AND OPERATOR** Optus is set to lead a joint bid with Raytheon Australia and Thales Australia to respond to the Australian Defence Force’s JP9102 tender.

The JP9102 program is aimed at delivering a fully sovereign military satellite communications (SATCOM) system that will enable the command and control of deployed task forces.

Leading the bid team, referred to as Team AUSSAT, Optus is expected to apply its experience operating seven telecommunications satellites to deploy software-defined satellite Optus 11 in 2023. Raytheon will leverage its expertise in delivering certified and integrated space systems and Thales will draw on its experience in supplying advanced secure communication solutions.

Optus has launched 10 satellites, operated 13 spacecraft and provided support to more than 100 international space programs since 1985.

Team AUSSAT will be competing against several other contractors, including Airbus, Boeing Defence Australia and Lockheed Martin Australia for the JP9102 tender, which is scheduled to close on 24 December.

*Source: Airforce Technology*

## Australia receives Triton NITE system

**THE COMMONWEALTH OF** Australia has received the MQ-4C Triton Network Integration Test Environment (NITE) capability, marking a milestone in the unmanned intelligence, surveillance and reconnaissance (ISR) acquisition program. To be based at RAAF Base Edinburgh, the NITE system was developed and delivered by Northrop Grumman Australia ahead of schedule.

The system enables mission support crews to design, configure and test Triton network interfaces and functions over ADF wide area networks. The capability will leverage the expertise and lessons learned by Northrop Grumman and the US Navy and reduce the risks associated with the introduction of a revolutionary ISR platform.

*Source: Airforce Technology*



**ABOVE** Reviewing the Triton network configuration files on the newly delivered Network Integration Test Environment. Photo: Northrop Grumman Corporation.

# Concept and assessment phase UNDERWAY ON TEMPEST



**BAE SYSTEMS HAS** signed a contract, worth approximately \$463 million, with the UK Ministry of Defence to design and develop the next-generation future combat air system (FCAS) known as Tempest. The contract marks the official start of the concept and assessment phase of the project that will be spread over the next four years. The FCAS program is being executed by Team Tempest, which includes Leonardo UK, Rolls-Royce, BAE Systems and MBDA UK.

Tempest is expected to produce an advanced fighter platform and integrate an entire network of capabilities such as un-crewed aircraft and advanced data systems. It is expected to be operational with the Royal Air Force in the mid-2030s.

*Source: Airforce Technology*



**LEFT** Artist's impression of the Tempest design concept. Image: BAE Systems.

A large, white, high-wing surveillance aircraft, the Northrop Grumman Triton, is shown in flight over a vast, hilly coastline. The aircraft has long, slender wings and a large sensor pod mounted under the nose. The background shows a vast expanse of land with rolling hills and a coastline, under a clear sky. A large white '7' logo is visible in the top right corner of the image area.

**Monitoring Australia's vast coastline.**

**That's Defining Possible.**

**NG7**  
NORTHROP GRUMMAN

[ngc.com/triton](http://ngc.com/triton)



Hornet receiving fuel from a US Air Force KC-10 refuelling aircraft.



THE GLOBAL  
**WAR**  
ON TERROR

PART FOUR OF OUR SERIES OF EDITED EXCERPTS FROM *THE AUSTRALIAN EXPERIENCE OF AIR POWER* OUTLINES THE RAAF CONTRIBUTION TO THE CAMPAIGN AGAINST TERROR IN THE MIDDLE EAST AND AFGHANISAN.

**T**HE FIRST RAAF DEPLOYMENT in the post-Cold War era was to the Middle East, in support of Operation Desert Storm, the United States coalition response to Iraq's invasion of Kuwait. RAAF C-130 and B707 aircraft operated a transport shuttle service between Australia and the Persian Gulf. A small team of RAAF intelligence analysts was also posted to Saudi Arabia. In 1998, the RAAF's first in-theatre commitment was made with deployment of two B-707 air-to-air refuelling aircraft and crews from No.84 Wing to Kuwait.

Then in 2001, in the wake of the 9/11 terrorist attacks, US President George W. Bush initiated the Global War on Terror. Australian Prime Minister John Howard, invoking the ANZUS Treaty, stated Australia's steadfast commitment to work with the US and committed Australian Defence Force (ADF) support.



## AFGHANISTAN

The initial ADF commitment to operations in Afghanistan and later in Iraq were actions intended to secure Australian security through coalition (partnership) building and, more directly, in action against international terrorism. RAAF expeditionary capability coupled with sound technical mastery has resulted in Air Force making significant contributions to coalition operations in the Middle East Area of Operations (MEAO).

In November 2001, the RAAF deployed elements of No.77 Squadron to Diego Garcia as part of Operation Slipper. Operating four F/A-18 aircraft, the detachment was principally tasked with flying combat air patrols over the island, a key forward base for the US in the Indian Ocean. The RAAF deployment concluded in May 2002 when it was determined there no longer existed an air threat to Diego Garcia.

However, in March 2002, the Air Force increased its commitment to Operation Slipper and again deployed a detachment of two RAAF B707 air-to-air refuelling aircraft, this time to Kyrgystan in Central Asia. The detachment was based at Ganci Air Base, named in memory of New York firefighter Peter J. Ganci, at Manas International Airport, a short distance north of Bishkek, the capital of Kyrgystan. The RAAF contingent shared the airport with about 1,850 other military personnel



**ABOVE** A Hornet returning from a mission in the MEAO. Photo: Defence Photographer WJG.



**BELOW** A RAAF AP-3C Orion returns to Al Minhad Airbase from a mission over Afghanistan in the MEAO. Photo: LS Paul Berry.

from seven nations: Denmark, France, the Netherlands, Norway, South Korea, Spain and the US. By the end of July 2002, the two RAAF aircraft had refuelled approximately 530 fighter and attack aircraft from the US Navy and Marine Corps, and the French Air Force. The detachment achieved an overall mission success rate of over 99 percent, and by the end of the deployment in September 2002, they had transferred more than six million pounds (3.5 million litres) of fuel in more than 800 refuelling engagements.

## OVERLAND ISR

The scope and tempo of ADF commitment to Operation Slipper in Afghanistan increased significantly during 2005, with a detachment of No.92 Wing AP-3C Orion, Maritime Patrol Aircraft operating out of Al Minhad, United Arab Emirates (UAE). While traditionally a maritime surveillance platform, the AP-3C aircraft were also employed in the overland Intelligence, Surveillance and Reconnaissance (ISR) role. The deployment, which began in January 2003, as part of Operation Falconer (see Iraq, page 25), proved so successful in both maritime and overland ISR operations, that the deployment was extended to support Operations Catalyst and Slipper. With advanced sensors, extended on-station persistence and the ability to relay real-time data to air and ground-based commanders, the AP-3C provided a critical capability. The deployment was concluded on 21 November 2012.



**ABOVE** Air Defence Guards patrol the perimeter of the control tower at Baghdad International Airport, 2003.



Bishkek detachment, Kyrgystan.



A RAAF Heron landing at Kandahar Airfield.  
Photo: CPL Raymond Vance.

While the ISR capabilities of the AP-3C Orion aircraft were well appreciated, the scope to employ unmanned aerial systems (UASs) in an ISR role within the Afghanistan theatre offered advantages over large fixed-wing aircraft operating from bases outside of the immediate battlespace. In response, the RAAF established a tactical level UAS detachment based at Kandahar Air Base. After selecting the Heron UAS – a one-tonne aircraft capable of medium-altitude, long-endurance flights – as the most suitable platform, the RAAF Heron detachment conducted the Air Force’s first UAS ISR mission on 9 August 2009. By October 2012, operating three platforms with an establishment of 28 personnel, the detachment had flown over 12,000 hours and provided Australian and coalition forces high-resolution, near real-time intelligence.

The ability to rapidly acquire and integrate a new capability has been an evolving ADF attribute. In the case of the Heron UAS, the skills, doctrine, tactics and procedures necessary to integrate the Heron system into the task force were developed almost entirely in theatre.

### CONTROL AND REPORTING

During June 2007, personnel from No.114 Mobile Control and Reporting Unit (114MCRU), No.41 Wing and airfield engineers from No.1 Airfield Operations Support Squadron began work on establishing a Control and Reporting Centre (CRC) at Camp Palomino, Kandahar Air Base. On 5 August, 114MCRU assumed control of airspace over the congested areas of Afghanistan from the outgoing US 73rd Expeditionary Air Control Squadron. That responsibility marked the first operational deployment of the unit since Malaysia in 1958, and the first time the recently upgraded TPS-77 Tactical Air Defence Radar System was used in earnest.

Tasked with management of Afghanistan’s operational airspace, the CRC represented a critical node in the command and control architecture and battlespace management system in the Afghanistan theatre. With large numbers of aircraft operating in the theatre in conjunction with widespread ground activities, the intensity and tempo of operations was found to be far in excess



**TOP** LAC Robert Cain, a geospatial imagery analyst, examining imagery from the Heron UAS.

**ABOVE** FLTLT Adam Penberthy working on the Entry Control Point at Camp Palomino.  
Photo: LAC Aaron Curran.



of that previously experienced by Australian controllers. Training for controllers and immediate support staff was therefore broadened to address the demands of such dynamic and complex airspace. By July 2009, the CRC's mission was completed and after handling more than 196,000 coalition aircraft movements 24 hours a day, seven days a week for two years, tactical air space management was transferred to the USAF's 451st Expeditionary Wing.

### MULTINATIONAL BASE

The RAAF commitment to operations in Afghanistan has been extensive and included embedded Air Force elements in Joint and Coalition formations. RAAF Air Load Teams were assigned to Joint

Movement and Force Logistics units in Kabul, Kandahar and Tarin Kowt, while medical personnel, intelligence and imagery specialists together with administrative and security staff complimented coalition teams at operational centres. In October 2012, 65 airfield defence guards (ADGs) and support personnel deployed to the multinational base at Tarin Kowt to take over responsibility for base security. As was typical of the RAAF approach to small and medium-level deployments, personnel for the Tarin Kowt security force were drawn from multiple units, Nos 1 and 2 Airfield Defence Squadron as well as the Security Police from No.395 Expeditionary Support Wing.

### IRAQ, 2003

In January 2003, two AP-3C Orion Maritime Patrol aircraft were deployed to the Middle East as part of Operation Bastille, the lead-up phase to the Australian contribution to the war in Iraq. The AP-3Cs flew in the overland ISR role from the UAE in support of Operation Falconer, and later Operations Catalyst and Slipper (part of the wider Operation Iraqi Freedom and Operation Enduring Freedom), for a decade. C-130s from Australia continued to support deployed ADF contingents operating in the MEAO. RAAF air traffic controllers were tasked with reopening Baghdad International Airport and training their Iraqi counterparts until 2004.

Fourteen F/A-18 Hornets of No.75 Squadron deployed to Qatar to provide air cover for coalition assets. The Hornets were also armed with precision-guided bombs to attack ground targets admissible under the Australian rules of engagement that including tanks, artillery and missile launchers.

As part of reconstruction efforts, the ADF provided personnel to generate the Australian Army Training Team Iraq (AATTI). RAAF Airfield Defence Guards (ADGs) contributed to AATTI and assisted with the training of recruits in security and logistics support.

From 2008, RAAF ADGs assisted the Army in securing the Australian Embassy in Baghdad, their tasks included sniper



A RAAF C-130 Hercules lands on a dirt strip at a forward operating base in Afghanistan to resupply the Australian Special Forces Task Group. Photo: SGT John Carroll.

## LOOKING FOR CUSTOM BRANDED MERCHANDISE FOR YOUR UNIT OR ORGANISATION?

Phoenix Embroidery specialises in producing a high-quality reproduction of your artwork and is here to help you create eye-catching products that demand attention.

Products we supply:

- Embroidered and PVC Patches
- Coffee Mugs and Stubby Coolers
- Caps, Tees and Polos
- Challenge Coins and Metal Pins



# 02 4962 2758

[www.phoenixembroidery.com.au](http://www.phoenixembroidery.com.au)



## PHOENIX EMBROIDERY

WITH 25+ YEARS EXPERIENCE PRODUCING MILLITARY MERCHANDISE

@PHOENIXEMB



 LAC Clifford Morgan (left) and CPL Pat Maron on duty at the entrance to the Australian Embassy in Baghdad. Photo: Department of Defence.

duties and armed escort. RAAF cooks and a senior logistics officer were also deployed before and after the ADF withdrawal in 2009.

Due to the ubiquitous nature of air power and the proximity of the Operations Falconer/Catalyst (Iraq) and Operation Slipper (Afghanistan) theatres, the RAAF was able to minimise its deployed footprint in the MEAO. The ISR Task Unit, consisting of two AP-3C Orion surveillance aircraft, and the Air Mobility Task Unit, maintaining C-130 aircraft in theatre, were able to supply the ISR and airlift needs to both operations. That economic use of resources combined with the coalition's decision to establish one Combined Air Operations Centre, to control air operations over both theatres, enabled the RAAF to contribute effectively to coalition objectives in two non-contiguous theatres.

The high-level of command experience afforded to RAAF officers in Joint and Coalition headquarters throughout the Middle East campaign was invaluable. Air Marshal Geoff Brown, future Chief of Air Force, was appointed the air task group commander of RAAF strike and airlift assets operating in theatre during the invasion of Iraq in 2003. The future Chief

of the Defence Force, Air Chief Marshal Mark Binskin, served as the first dedicated non-USAF Director of the US Central Air Force Combined Air Operations Centre, responsible for the conduct of coalition air commitments during Operation Iraqi Freedom and Operation Enduring Freedom (ADF Operations Catalyst and Slipper respectively).

### OPERATION OKRA

Operation Okra was the ADF contribution to the military intervention against the Islamic State of Iraq and the Levant (ISIL). The RAAF generated an Air Task Group comprising 400 personnel, and initially eight F/A-18F Super Hornets from No.1 Squadron, an E-7A Wedgetail AEW&C aircraft from No.2 Squadron, and a KC-30A Multi-Role Tanker Transport from No.33 Squadron. Combat operations against objectives in Iraq commenced in September 2014 and were extended to Syria the following year.

Super Hornet strike missions, operating mainly from Al Minhad Air Base in the UAE, supported Iraqi and Kurdish land forces, targeting ISIL military equipment and facilities. Meanwhile RAAF C-17 and C-130J aircraft, together with USAF and RAF transports, conducted airdrops of

humanitarian aid to isolated civilians and airlifted arms and munitions.

A second Air Task Group comprising six single-seat F/A-18As from No.75 Squadron relieved the No.1 Squadron contingent in January 2015, at which time RAAF aircraft provided about 13 percent of coalition air strikes in Iraq. Rotations from No.77 Squadron took over the deployment in September, replaced by No.3 Squadron the following April. On 18 September 2016, two F/A-18As and the Wedgetail formed part of a multi-national force consisting of US, UK and Danish aircraft which accidentally bombed irregular Syrian Army forces near the city of Deir ez-Zor.

RAAF Hornet fleets conducted over 2,700 sorties before strike operations ceased in January 2018, following the recapture of the last remaining ISIL-held areas of Iraq by government forces. The KC-30A and Wedgetail aircraft and crews remained in theatre, alternating with four-month deployments. The final rotation of Air Task Group aircraft concluded in September 2020. **W**

*The final part in our RAAF History series will relate the RAAF's continual contribution to peacekeeping and humanitarian aid at home and abroad.*

**LOCKHEED MARTIN**  
*Australia*



Unmatched security. New capabilities.  
Stronger economies.  
That's moving forward together.

Lockheed Martin. Your Mission is Ours.®



# PRELUDE TO A 5TH GENERATION AIR FORCE



## AS THE RAAF PREPARES TO RETIRE THE LAST OF ITS F/A-18 CLASSIC HORNETS, WE TAKE A LOOK AT THE AIRCRAFT'S HISTORY AND SERVICE RECORD.

**E**VEN BEFORE THE LAST Mirage IIIO fighter had entered service, the RAAF was looking ahead for a replacement.

Although a requirement definition can be traced back to 1968 and new aircraft were studied as they were announced or became available, it was not until 1973 that the first serious inspections were carried out. A team visited the USA and Europe to study the McDonnell Douglas F-15, Northrop P600 (YF-17), Saab JA37 Viggen and the AMD (Avions Marcel Dassault) Mirage F1 programs, but their ultimate recommendation was that the RAAF defer any decision until further fighter aircraft developments emerged.

The Tactical Fighter Project Office was established in 1976 and tasked to form a working group to consider the Mirage replacement. A worldwide request for proposal was submitted in November that year for the next tactical fighter (NFT), and 11 responses were received.

March 1977 saw the initial list reduced to six contenders: the General Dynamics F-16; AMD's Mirage 2000; the McDonnell Douglas F-15 Eagle; the Panavia Tornado; McDonnell Douglas's F-18A; and its land-based variant, the Northrop F-18L.

Factions within the Defence bureaucracy thought the strategic situation in the mid-to-late 1970s was very secure and that the F-15 was, if anything, too capable. They reasoned that the Eagle would potentially present a destabilising influence in what was at the time, a politically benign region. So exited the Eagle.

The F-111 had only just entered RAAF service and the Panavia Tornado was designed to prosecute a similar role. As a

fighter variant was at least a decade from reality, the Tornado was also discarded.

In 1979, two evaluation teams were established to conduct simultaneous reviews of the remaining four contenders: the Mirage 2000; F-16; F-18A; and F-18L. One team was tasked to examine the operational capabilities, engineering and support requirements, while the second explored the potential for Australian industry participation.

In late 1979, the Mirage 2000 and the F-18L were dropped from the competition. While some felt the Mirage 2000 would be a logical replacement, and its manoeuvring winglets and digital flight control system provided superb handling out to Mach 2, the evaluation identified significant deficiencies in the likely performance of its radar and avionics suites, its fuel system, cockpit design and weapons capability when compared to its US rivals.

The F-18L was favourably assessed; it was lighter, faster and more manoeuvrable than the F-18A, and could carry a heavier load. However, the evaluation team considered the technical risk associated with being lead customer for an aircraft which, at that time, had attracted no other orders was too significant.



**LEFT** F/A-18A Hornet A21-39 from No.77 Squadron off the coast of Newcastle, NSW. Photo: SGT David Gibbs.



**BELOW** A General Dynamics F-16A.

### F-16 VS F/A-18

Thus, the competition was short-listed to just two, the General Dynamics F-16A then entering service with the US Air Force, Israel and several NATO nations, and the US Navy's McDonnell Douglas F/A-18.

The evaluation teams were impressed with many elements of the F/A-18 program. In particular, the aircraft designed to be operated from an aircraft carrier had a great deal of engineered redundancy, fail-safe modes and airframe robustness, features seen as ideal for the RAAF operational posture – remote, forward projection, and Australia's limited means. Comprehensive built-in test and system health monitoring were also attractive attributes, as those features would minimise the scale of logistic support required to sustain operations from northern bare bases.

The test team described the F/A-18's handling as benign and trouble free, and the aircraft could be flown to the edge of the flight envelope with total confidence. In particular, its two new-generation GE F404 engines gave extraordinary reliability throughout and beyond the full flight envelope.

At the end of the day, perhaps the biggest perceived difference between the two aircraft which eventually defeated the F-16, was the twin engine versus single engine debate, and the associated attrition rate expected over the life of the NFT. The evaluation team was able to illustrate that single-engined fighters would, on average, suffer 10 Class-A accidents (airframe losses) every 100,000 flying hours compared with less than five per 100,000 hours for twin-





engined fighters. Accident rates for US Navy jet operations were not included in the analysis due to the complexity and inherent dangers of carrier aviation.

It was clear that both the F-16 and the F/A-18 substantially met the RAAF requirement. While the F-16 project cost was significantly less than that of the F/A-18, several key issues led to a strong, unanimous recommendation to acquire the F/A-18 Hornet.

In a speech to the Australian Parliament on the evening of 20 October 1981, Minister for Defence Sir James Killen announced that the McDonnell Douglas F/A-18A Hornet had been selected to replace the Mirage III in RAAF service. Below is an edited excerpt from his speech.

"In air combat, our fighters are likely to have to operate over and beyond our vast northern regions without the extensive and close control available in the European environment. Hostile surface forces would usually have to cross large expanses of water. Australia's tactical fighter therefore requires long range and endurance to be able to seek out its targets at a distance.

"The F/A-18 has been developed from the outset as a multi-role aircraft, with all-weather air-to-air and air-to-surface missiles, and all-weather navigation and weapons targeting systems. These systems give it unparalleled flexibility.

"Finally, my advisors are unanimous in their advice that, principally because of its twin engines, the F/A-18 offers a clear prospect of fewer losses throughout its operation life." The complete speech can be read at [tinyurl.com/Killenspeech](http://tinyurl.com/Killenspeech).

### ACQUISITION PROGRAM

The government negotiated a contract with McDonnell Douglas Corporation for the acquisition of 57 F/A-18As and 18 F/A-18Bs under foreign military sales arrangements with the US Navy as the facilitating agency. The contract included substantial Australian industry involvement to deliver a degree of technology transfer and to provide an industrial base for through-life support for the Hornet fleet.

The first four F/A-18B aircraft (A21-101, 102, 103 and 104) were assembled at the McDonnell Douglas plant at St Louis, Missouri, with the remainder assembled in Australia at the Government Aircraft Factories (GAF), Avalon, Victoria.

After assembly, 101 and 102 were ferried to Naval Air Test Center, Patuxent River, Maryland, for evaluation and qualification of RAAF specific modifications, electromagnetic interference/compatibility qualification and No.2 Operational Conversion Unit crew (both flight and technical) continuation training. A21-103 and



**ABOVE** No.3 Squadron Classic Hornet A21-17 configured for a multi-role mission with four AGM-84 Harpoon anti-ship missiles, two AIM-7 Sparrow radar-guided air-to-air missiles (AAM) and two AIM-9 infra-red guided AAM.



**BELOW** SQNLDR Mark Hayler greeted by wife Jenny after delivering A21-103 to RAAF Base Williamtown, NSW on 4 May 1985.





**Aviation**  
AUSTRALIA

# Transition to Civilian Aviation or enhance your DASR Part 66 Licence

**USE YOUR QUALIFICATIONS, TRAINING AND EXPERIENCE TO BECOME A CASA LICENSED AIRCRAFT MAINTENANCE ENGINEER.**

Realise your potential and join the host of engineers who have successfully gained a CASR Part 66 Licence outcome with Aviation Australia.

We offer a broad range of training services including:

- ✔ Training & Assessment of basic knowledge and practical competencies to remove DASR Part 66 MAML exclusions, or add additional categories to your existing licence
- ✔ Recognition of Prior Learning (RPL) and self-paced study towards CASR Part 66 Aircraft Maintenance Engineer Licence outcomes
- ✔ Nationally recognised career enhancer courses that satisfy DASR and CASR Part 66 and Part 145 training requirements
- ✔ Tailored outcomes, including workplace competency assessments
- ✔ Part 66 examinations at exam centres in all States and Territories nationwide

**CONTACT US TO FIND OUT MORE**

- ☎ 07 3860 0900
- ✉ [industry@aviationaustralia.aero](mailto:industry@aviationaustralia.aero)
- 🌐 [www.aviationaustralia.aero](http://www.aviationaustralia.aero)

104 were disassembled and flown to the GAF final assembly plant at Avalon in a USAF C-5 Galaxy transport. Both were then reassembled by GAF technicians to introduce and exercise the process to be applied to the remainder of the fleet.

Following assembly, each aircraft was subject to a battery of ground tests to demonstrate correct build standard and function and test flown by both McDonnell Douglas and the USN/RAAF to assure the product satisfied contractual obligations. Production flight test typically involved two flights by a company pilot, the first to assess primary flight system function (engine, flight controls) and the second to assess mission system function (radar, navigation and pilot interface). Customer acceptance tests by a RAAF pilot were essentially a repeat of the production profiles to confirm the aircraft could be accepted into service.

After successfully completing its flight test program, A21-103 was ferried to RAAF Base Williamtown by SQNLDR Mark Hayler, with AVM Peter Scully in the aft cockpit, and formally transferred to the RAAF on 4 May 1985. A21-101 and 102 made the epic trans-Pacific crossing as a formation pair departing Naval Air Station, Lemoore on 16 May and arriving at RAAF Base Williamtown the following day after multiple air-to-air refuelling (AAR) engagements with a USAF KC-10 tanker.

For the New Tactical Fighter Program, Australian industry was engaged in a range of manufacture and assembly processes, an initiative that spawned the evolving aerospace industry we recognise today.

Apart from final assembly, test and delivery, GAF manufactured wing and fuselage components for the global fleet and the windscreen and canopy assemblies for RAAF aircraft. Commonwealth Aircraft Corporation at Fishermans Bend, Melbourne manufactured engine bay doors, engine aft nozzle fairings, weapons pylons and assembled General Electric F404 engines for RAAF Hornets and to supply American production. Hawker de Havilland at Bankstown, Sydney manufactured nose and main landing gear assemblies as well as rudder and aileron hydraulic actuators. Phillips Electronic Systems assembled the APG-65 radar system and the radar data processing module. Many smaller Australian businesses were engaged to deliver components for the larger assemblies.



## MIRAGE V HORNET

Many of the pilots who made the transition from Mirage III to F/A-18 described the Hornet as being from a different world. Indeed, the leap from post-war early 1950s technology of the Mirage to the digital age of the 1980s F/A-18 forced the RAAF to not only review the way the aircraft were flown and maintained, but also to revise its entire warfighting doctrine.

Although few Mirage pilots had difficulty transitioning to the F/A-18, they were required to learn a whole new skills base. While the pure motor skills required to stay alive in the twitchy Mirage were no longer needed in the forgiving, software-driven Hornet, and the Mirage pilot's 'gunfighter' skills were made virtually redundant, the complexity of the new multi-role weapon systems, including the ability to tailor the digital cockpit displays in many possible combinations required new skills in cockpit workload management.

From an engineering viewpoint, the Hornet was light-years ahead of the Mirage. Because it was designed for the rigours of carrier borne operations, restrictive work environments and limited spares stocks onboard ship, the reliability and redundancy of its systems were a

primary design focus. Avionic components in forward fuselage bays were located behind easily opened panels at chest or head height, usually easily accessible and if necessary, repaired or removed inside the aircraft's 'hangar footprint'. The GE F404 engines could be 'dropped out' from the rear fuselage by two technicians using a specially designed trolley lift, while engine accessory modules could be changed and re-fitted without any need for proving ground runs.

The APG-65 system presented a defining example of the F/A-18's systems reliability compared with that of the Mirage. The Cyrano radar in the Mirage frequently registered mean time between failure (MTBF) rates of less than five hours, however the APG-65 was designed to yield and achieved an MTBF greater than 104 hours, more than 20 times that of the Cyrano. Similarly, the Hornet's built-in test function was able to quickly direct technicians to the source of problems. Hornets would often fly for 'weeks' without defect.



**ABOVE** A RAAF Mirage III fighter jet on the flightline at RAAF Base Darwin during Exercise Pitch Black 84. Photo: MSGT David N. Craft.





# F/A-18A/B COMBAT OPERATIONS

## OPERATION SLIPPER Diego Garcia

No.77 Squadron	4 aircraft	9 November 2001 - 10 February 2002
No.3 Squadron	4 aircraft	10 February 2002 - 20 May 2002

## OPERATION BASTILLE Al Udeid Air Base, Qatar

No.75 Squadron	14 aircraft	16 February 2003 - 18 March 2003
----------------	-------------	----------------------------------

## OPERATION FALCONER Al Udeid Air Base, Qatar

No.75 Squadron	14 aircraft	19 March 2003 - 3 May 2003
----------------	-------------	----------------------------

## OPERATION OKRA Al Minhad Air Base, United Arab Emirates

No.75 Squadron	6 aircraft	15 March 2015 - September 2015
No.77 Squadron	6 aircraft	September 2015 - 25 March 2016
No.3 Squadron	6 aircraft	25 March 2016 - 29 September 2016
No.75 Squadron	7 aircraft	29 September 2016 - 22 January 2017



A No.3 Squadron technician completes after-flight checks on an F/A-18 Hornet on the RAAF Base Darwin flightline during Exercise Pitch Black 2004. Photo: Corporal Michelle Lucraft.



## HORNET OPERATIONS

For the first 18 years of service, the Classic Hornet was employed in training and exercise roles. During that period, the aircraft underwent significant upgrades, each upgrade improving its war-fighting capability and survivability. In 1990, the government rejected the notion of deploying the Classic Hornet to the Middle East as a part of expanding the Australian commitment to the Gulf War. The upgrade process was not complete and the fleet possessed a lower level of capability, particularly in terms of self-defence, than the rest of the coalition force already deployed. The Hornet force supported Royal Australian Navy ships' preparation for participation in the Gulf War (Operation Damask).

During the initial phases of Australia's commitment to peacekeeping operations in Timor Leste, No.75 Squadron was placed on alert to provide close air support and air defence for the multinational force. However, no action ensued.

The first opportunity for operational deployment arose following the attack on the World Trade Centre on 11 September 2001. As a part of the War on Terrorism, under Operation Slipper, four aircraft were deployed to Diego Garcia in the Indian Ocean to provide air defence for the USAF air base and Military Sea Command vessels positioned at the island to support US operations in the Middle East. That commitment was the first operational employment of the RAAF fighter force since the deployment of Sabre aircraft to Ubon, Thailand in June

1962. The deployment to Diego Garcia lasted from November 2001 until May 2002. No.77 Squadron held the initial deployment and was relieved by No.3 Squadron in February 2002. There was little activity although Hornets were scrambled several times in response to unidentified aircraft.

The conundrum concerning Iraqi possession of weapons of mass destruction resulted in Australia mounting Operation Bastille as part of United Nations efforts to disarm Iraq. Bastille committed a No.75 Squadron deployment to Al Udeid Air Base in Qatar, to provide air defence in what became known as the Middle East Area of Operations (MEAO) and ran from 16 February to 18 March 2003. Although just over a month long, the operation provided a period of work-up in a non-operational environment prior to the conduct of operations against Iraq. No.75 Squadron remained deployed with 14 aircraft under Operation Falconer; aircrew and aircraft drawn from across the three Classic Hornet squadrons. By that time the Hornet fleet had largely completed the ongoing upgrade process resulting in a considerable improvement in their avionics, electronics and weapons systems providing a significant step up in the Hornet's combat capabilities. The current Chief of Air Force, Air Marshal Mel Hupfeld, led the squadron during the work-up training period in Australia and during Operations Bastille and Falconer.

Operation Falconer marked the invasion of Iraq and lasted from 19 March 2003 until 3 May 2003. The Hornet contingent

was initially assigned to protect high-value assets – AAR tankers and Airborne Early Warning and Control (AEW&C) aircraft. However, as it quickly became apparent that the Iraqi Air Force was not going to contest the air space, No.75 Squadron switched to ground attack and dropped the first bomb in an interdiction campaign against Iraqi ground forces on 21 March 2003. That was the first time since the Vietnam War the RAAF had dropped a bomb in combat operations. The squadron was tasked to support the US Army V Corps, but was rarely assigned targets to attack. RAAF commanders in the MEAO successfully sought reassignment of the squadron to support the US Marine Corps' 1st Marine Expeditionary Force.

It was a considerable flying distance from Al Udeid Air Base to the area of operations – 965km to Basra, Iraq's most southern city, and more than 1,600km to Baghdad. Consequently, the squadron flew long missions lasting five or six hours supported with AAR. Using laser-guided bombs, the Hornets attacked Iraqi tanks, trucks, and artillery, as well as bunkers and



**ABOVE LEFT** Wing Commander Mel Hupfeld (second from right) and fellow pilots are welcomed back to base by Group Captain William Henman (right) after successfully completing their final combat mission over the Middle East for Operation Falconer. Photo: Defence Photographer WJG.



**BELOW** An F/A-18 refuels from a USAF KC-135 over international waters south of Basra, Iraq during a combat mission. Photo: W02 Al Green.



# SMS Aircraft

Authorised Sales Representative for Gulfstream



Representing Buyers and Sellers of New and Pre-Owned High-End Business Aircraft for 26 years.  
Contact Gary Svensen: +61 3 9863 9550 or +61 417 727 727 | [gsvensen@smsaircraft.com](mailto:gsvensen@smsaircraft.com)

[www.smsaircraft.com](http://www.smsaircraft.com)



No.77 Squadron Hornets A21-39 (lead) and A21-07 off the coast of Newcastle, NSW. A third aircraft, A21-23, is almost completely concealed by the lead. Photo: AC Sam Price.

fuel and munitions storage areas. As Iraqi resistance crumbled, the Hornets flew close air-support missions to assist Australian and other ground forces as they advanced on Tikrit, north of Baghdad, a centre of support for the regime. During the first two weeks, the tempo of the war required the squadron to fly about 12 sorties a day, but the rate subsequently reduced to six to 10 sorties per day. Operation Falconer saw the squadron fly 350 combat missions, including 670 individual sorties and deliver 122 laser-guided, high-explosive bombs. The squadron returned home in May 2003 on completion of Operation Falconer.

The Hornet force returned to the MEAO on 15 March 2015 as part of an Air Task Group on Operation Okra, to operate from Al Minhad Air Base in the United Arab Emirates. Okra was the ADF's contribution to the International Coalition Joint Task Force 633 established to eliminate Daesh in Iraq and Syria.

Six No.75 Squadron single-seat classic Hornets relieved the six dual-seat Super Hornets of No.1 Squadron's that had been in-theatre since September 2014. Other elements of the Air Task Group included a No.2 Squadron E-7A Wedgetail AEW&C aircraft and a No.33 Squadron KC-30A Multi-Role Tanker Transport.

Since its previous deployment to the MEAO, the Classic Hornet had undergone another set of upgrades and the aircraft was significantly more capable than when it was there a decade earlier. A bunker raid on a "senior IS figure" opened the squadron's combat activity in August 2015, followed by airstrikes in Syria in September. After a combat tour of six months, No.75 Squadron handed over to No.77 Squadron later that month. During 77 Squadron's tour the operational tempo increased significantly, and the squadron participated in the largest bracket of coalition airstrikes in the month of December and they, with other coalition aircraft, destroyed 137 Daesh targets.

No.3 Squadron relieved No.77 Squadron in March 2016 and for the next 14 months each of the Classic Hornet squadrons rotated through the MEAO in six-month cycles. From October 2016, the deployed aircraft strength increased from six to seven. The Classic Hornet force finally returned to Australia in May 2017, to be replaced by Super Hornets until end of combat operations.

The Classic Hornet effort in the MEAO totalled 26 months and expended 14,000 flight hours and 1,500 precision guided munitions either GPS or laser-guided Joint Direct Attack Munition bombs. Hornets

attacked Daesh military equipment and facilities in Syria and Iraq in support of Iraqi and Kurdish troops on the ground. They also provided close air support to Australian and allied troops neutralising Daesh influence.

Hornet operations have not been confined to the Indian Ocean or the Middle East. The attack on the World Trade Centre, the catalyst for the Classic Hornet operations on Diego Garcia, also raised the requirement for a higher level of security in Australia. The aerial attack using hijacked airliners presented a completely new dimension for air defence security operations. Australia was scheduled to host the Commonwealth Heads of Government Meeting (CHOGM) just a month after the attack on the World Trade Centre. However, that was postponed until March 2002, some five months later. The risk of a similar type of attack on the gathering of leaders of the Commonwealth was a major consideration and for the first time since World War II, RAAF aircraft were tasked to fly air defence operations over Australia. No.3 Squadron flew combat air patrols over Coolumb Beach and six months later No.77 Squadron was flying combat air patrols over Canberra when President George W. Bush visited the city.

In September 2007 Hornets patrolled



**ABOVE** F/A-18A/B Hornets from No.2 Operational Conversion Unit conduct a formation flight, in the shape of a number 2 in the airspace around RAAF Base Williamtown. CPL Craig Barrett.

over Sydney to cover the APEC leaders meeting, while in October 2011 Hornets were deployed to RAAF Pearce to fly protective cover over Perth for the CHOGM meeting the following month. Hornet aircraft also mounted protective patrols over Canberra and Darwin when President Obama visited those cities in 2011.

After an epic 36 years, the F/A-18A/B Classic Hornet will retire from RAAF service in December 2021. No.75 Squadron, the last to operate the Classic, will transition to the fifth-generation F-35A Lightning II early in 2022. The multi-role fighter has been deployed on combat operations for five of the past 20 years and it has flown protective combat air patrols over the Australian homeland on seven occasions of significant national events. The aircraft was designed to operate for 6,000 flight hours, and a few have achieved that milestone, many of the younger airframes will continue to provide service in the Royal Canadian Air Force. Only four aircraft were lost to accidents,

a remarkable testament to the quality of the platform and those who flew and sustained the aircraft. The nation owes all those involved in the selection, procurement and operation of the McDonnell Douglas F/A-18A/B Hornet multi-role fighter a vote of thanks for a job well done. **W**

*Compiled by AVM (Ret'd) Bob Treloar from the transcript of an interview with AVM (Ret'd) Bob Richardson by editor Andrew McLachlan for Australian Aviation, and History and Heritage Branch records provided by GPCAPT Jenny Fantini. Details of the Hornet Operations are drawn from Aircraft of the Royal Australian Air Force.*

To view a video of former F/A-18 Hornet pilot, Matt Hall, talking about the RAAF flying training program, scan the QR code.





**SERVING  
INDUSTRY  
SINCE 1969**

**As an important supplier to Royal Australian Air Force on projects such as the Loyal Wingman, our expertise in the machining of thin wall 5 Axis machining of 7000 series aluminium enables us to supply finished components to all types of aerospace parts.**



**AUSTRALIA:** PERTH | MELBOURNE | BENDIGO | NEWCASTLE  
**INTERNATIONAL:** CHILE | PERU | INDIA | CHINA | NORTH AMERICA

[www.hofmannengineering.com](http://www.hofmannengineering.com)

# F/A-18A HORNET A21-018

WINGS VOLUME 73 NO.4




Brakes release – No.75 Squadron Hornet A21-18  
rolls for take-off at RAAF Base Tindal.



# OUR LARGEST FAST-JET BASE



HOME TO AUSTRALIA'S NEWEST AIR COMBAT CAPABILITY, THE F-35A LIGHTNING II AIRCRAFT, RAAF WILLIAMTOWN IS ONE OF THE NATION'S BUSIEST AND MOST COMPLEX BASES.

  
**ABOVE** F-35A Lightning II aircraft A35-036 and A35-037 taxi back to the lines at RAAF Base Williamtown after transiting from the United States. CPL Melina Young.

  
**RIGHT** Aerial view of RAAF Base Williamtown, runway and taxiways. Photo: CPL Craig Barrett.

located 30km north of Newcastle, NSW, RAAF Base Williamtown is home to the Tactical Fighter Force of the Australian Defence Force. The base is currently established as the home port for two Operational F-35A Fighter Squadrons, Forward Air Control, lead-in fighter and F-35A training units and the Airborne Early Warning and Control Squadron operating the E-7A Wedgetail. The RAAF leases access to the airfield to Newcastle Airport for commercial public transport operations and the airfield handles, on average, more than 1,000 military and civilian air movements a week.





## HISTORY

RAAF Station Williamtown was established on 15 February 1941 to provide protection for the strategic port and steel manufacturing facilities of the Hunter region. The base was initially served by four runways, each 1,100m long, to meet the needs of the Williamtown Flying School. A number of Australian Empire Air Training Scheme squadrons were formed at Williamtown before proceeding overseas and No.4 Operational Training Unit was located at the Base from October 1942 until it was disbanded in April 1944.

Following World War II, Williamtown was retained as the RAAF's main fighter base and equipped initially with squadrons of Gloster Meteor, subsequently superseded by CA-27 Sabre fighters. Commencing in 1964, the Sabres were replaced with Dassault Mirage III aircraft. On-base facilities were progressively expanded post war through until the late 1960s. In 1983, the role of Williamtown was upgraded to a tactical fighter base in preparation of the replacement of the Mirages with the F/A-18 Hornet. The following year, Williamtown became headquarters for the Tactical Fighter Group and acquired new headquarter buildings, hangars, workshops, stores, medical facilities and a base chapel.

Today, RAAF Base Williamtown employs approximately 3,800 personnel (military and civilians) and up to 500 contractors. It contributes more than \$280 million a year, by way of salaries, to the region's economy. Apart from the operational and training assets identified in the introduction, RAAF Base Williamtown

is also home to Air Combat Group; Surveillance and Response Group; elements of Combat Support Group, Air Warfare Centre and Capability Acquisition and Sustainment Group; the Australian Defence Force Warfare Training Centre and the Williamtown Aviation Heritage Centre (Fighter World, an element of History and Heritage Branch – Air Force).

As the nation's main air combat pilot training base, RAAF Williamtown will be home to the majority of the RAAF's newest air combat capability, the F-35A Lightning II aircraft. Australia has committed to purchasing 72 of the fifth-generation aircraft; 58 to be based at RAAF Williamtown.

## BASE REDEVELOPMENT

The base recently completed the largest infrastructure redevelopment program since its establishment during World War II at a total cost of some \$1.5 billion. The program was implemented to accommodate the F-35A and all the new facilities and runway works designed to support the aircraft were completed in 2020.

Another major infrastructure project, the Williamtown Stage 2 Facilities Upgrade Program, was completed in early 2021. Ageing administration facilities were replaced by the new five-storey Len Waters building. The new headquarters houses some 950 personnel who were previously scattered around the base. The first occupants moved into the building in February 2020; final occupants taking up residency in July 2020.

The building was named to honour Leonard (Len) Victor Waters, the first and only known Australian Indigenous military aviator to serve as a fighter pilot during World War II. Len was working as a shearer when he joined the RAAF in 1942 and initially trained as a mechanic, he volunteered for flying duties and graduated as a Sergeant pilot in 1944. He flew P-40 Kittyhawks in the South-West Pacific theatre where he completed 95 mainly close air support missions.

A program to repair Williamtown's runway substrate and upgrade the runway surface will commence in late 2021 and is expected to be completed by 2023. The project will both extend the serviceable life of the runway, as a result of a full-depth reconstruction, and widen it to Class E standard to support larger aircraft operations.





## AIR COMBAT GROUP

Air Combat Group (ACG) is one of the larger Force Element Groups in the ADF, with more than 2,000 personnel across three wings, comprising nine squadrons. It is headquartered at RAAF Base Williamtown and provides a single command structure for all of the RAAF's fast-jet combat capability: F/A-18 Super Hornet, EA-18G Growler, Hawk 127 and the PC-21 Forward Air Control (FAC) platforms. ACG commenced the transition from the Classic Hornet to the F-35A Lightning II in late 2018.

Within ACG, No.78 Wing HQ manages Air-Surface Integration activities for Force Generation in its role as the Tactical Air Wing. No.78 Wing also provides the foundation training that supports Australia's air combat capability. Two of its three squadrons are based at Williamtown.

No.76 Squadron operates Hawk 127 aircraft in the lead-in fighter training role and in support of training for Land and Maritime Forces. It trains fast-jet aircrew in basic air combat tactics and procedures prior to their conversion to operational types and conducts air support for ADF elements in the form of Adversary Air, Fleet Support and Close Air Support operations.



**TOP** A Combat Controller and pilot with the fleet of PC-21 aircraft operated by No.4 Squadron.  
Photo: CPL Craig Barrett.

**ABOVE** A Hawk 127 lead-in fighter A27-10 over Port Stephens NSW.  
Photo: SGT David Gibbs

No.4 Squadron operates the PC-21 aircraft providing Combat Controllers to the joint force, and Joint Terminal Air Controller (JTAC) and battlefield Air Support Control Officer (ASCO) training.

The third squadron, No.79 is based at RAAF Base Pearce, WA and is responsible for initial fast-jet training on Hawk 127 aircraft for graduate pilots or those transitioning from other fleets.

No.81 Wing provides most of the ADF's air combat capability. It comprises three operational fighter squadrons and one training unit, with approximately 1,000 personnel spread between RAAF Williamtown and RAAF Base Tindal, NT. The squadrons that make up No.81 Wing are: No.2 Operational Conversion Unit at RAAF Williamtown, which transitioned from the F/A-18A/B Hornet to the F-35A Lightning II fighter in January 2020; No.3 Squadron, RAAF's first F-35A squadron, which returned to RAAF Williamtown from the USA in December 2018; and the other two frontline fighter squadrons – No.77

Squadron at RAAF Williamtown, which began transitioning to the F-35A in January 2021 and No.75 Squadron at RAAF Tindal, NT which will continue to operate the F/A-18A Hornet until the end of 2021 before transitioning to the F-35A.

No.2 Operational Conversion Unit's (OCU) primary mission is to train F-35A Lightning II fighter pilots. It runs the Operational Conversion Course, which progresses pilots qualified to fly the Hawk 127 lead-in fighter into fully qualified F-35A Lightning II combat pilots. No.2 OCU also conducts the annual Fighter Combat Instructors course to generate tactical specialists in the application of lethal air power.

No.3 Squadron is Australia's oldest fighter squadron, formed in 1916 prior to the RAAF itself. The squadron was established at Luke Air Force Base, Arizona, USA throughout 2019 to conduct pilot and maintenance training for personnel transitioning to the F-35A and to verify and validate Australian logistic

and operational systems that support the aircraft. It reached initial operating capability in December 2020.

The three operational fighter squadrons, Nos 3, 75 and 77 are established to conduct sustained combat operations to deliver precision offensive and defensive airpower as required for the defence of Australia. All have distinguished combat histories from earlier and more recent conflicts.

## SURVEILLANCE AND RESPONSE GROUP

Headquartered at RAAF Base Williamtown, Surveillance and Response Group (SRG) incorporates No.41 Wing (Air Defence and Battlespace Management), No.42 Wing (Airborne Early Warning and Control – AWAC), No.44 Wing (Air Traffic Control) and No.92 Wing (Maritime Air Power). SRG is developing and delivering Intelligence, surveillance, reconnaissance and electronic warfare capabilities to

## GSE SALES - HIRE - MAINTENANCE



Australasia's Largest Distributor of Refurbished Aviation Ground Support Equipment providing **'BEST VALUE'** solutions to the Aviation Industry.

**AIR START UNITS | AIRCRAFT PUSH-BACK TRACTORS | GROUND POWER UNITS | AIR CONDITIONING UNITS  
BAGGAGE TUGS | BELT LOADERS | AIR STAIRS | PALLET LOADERS | TRANSPONDERS**



Aviation Ground Support Equipment

Brisbane Airport QLD 4008

**P:** +61 7 3860 6800

**E:** [info@ozgse.com.au](mailto:info@ozgse.com.au)

**W:** [www.ozgse.com.au](http://www.ozgse.com.au)



All six E-7A Wedgetails from No.2 Squadron on the tarmac at RAAF Base Williamtown. Photo: CPL Craig Barrett.

prepare the Air Force for the introduction of new systems including maritime unmanned aerial systems.

No.42 Wing controls two subordinate squadrons: No.10 Squadron operating two AP-3C Orion aircraft in an Electronic Warfare role from Edinburgh, and No.2 Squadron operating the RAAF fleet of six E-7A Wedgetail AWAC aircraft from Williamtown. No.2 Squadron was originally formed in 1916 and has been raised and disbanded a number of times since. The squadron saw action in the South-West Pacific theatre during World War II and with the Canberra bomber during the Malayan Emergency and the Vietnam War and most recently with the Wedgetail in the Middle East.

SRG also supports the ongoing development of cyber and space capabilities to ensure Air Force and the ADF are mission-ready across multiple domains. Approximately 750 of SRG's more than 2,000 personnel serve at Williamtown.

### COMBAT SUPPORT GROUP

Combat Support Group (CSG) prepares for and conducts flexible combat support operations and provides the ADF with an expeditionary airbase capability in either a joint or combined environment. The group is organised into four functional units: Nos 95

and 96 Wings, Health Services Wing and Airfield Defence Guards.

Five squadrons of CSG are based at Williamtown: No.26 City of Newcastle Squadron, No.381 Squadron, No.2 Expeditionary Health Squadron, No.1 Security Forces Squadron and No.1 Combat Communications Squadron – Williamtown detachment.

No.26 Squadron was formed at RAAF Base Williamtown on 1 July 1981 and is Williamtown's Airbase Operations Squadron, forming an element of No.96 Wing. It has more than 250 Air Force and Public Service personnel responsible for providing coordinated support for air and ground operations at the base. No.26 Squadron is structured to be deployable in support of CSG commitments throughout Australia and overseas.

No.381 Squadron is one of three Contingency Response Squadrons (CRS) under command of 95 Wing, headquartered at RAAF Base Amberley, Qld. CRS provide a scalable resource to establish and operate expeditionary airfields or bases in forward or contingent locations. It can be activated at very short notice and personnel are specifically trained in the reception, preparation and transport of humanitarian aid.

No.2 Expeditionary Health Squadron

(2EHS) is the custodian of the deployable Role 1 Health Facility (R1HF) for Air Force delivering health effects that are both scalable and rapid; with a focus on aviation medicine and the aeromedical evacuation system. The 2EHS primary role is to deploy health elements at very short notice to locations in Australia and overseas. The deployable health elements 2EHS maintains include several R1HFs, environmental health, Hazard Assessment Team capability for Air Force, dental, radiography, casualty holding, occupational medicine and surgical specialists.

No.1 Security Forces Squadron (1SECFOR) provides essential security functions through the employment of Security Forces personnel and is responsible for providing force protection measures including flight-line security, incident response and weapon training to Air Force personnel. 1SECFOR also supports expeditionary operations contributing to very-short-notice-to-move security requirements of deployed Air Force assets on force assets on exercise and operations globally.

No.1 Combat Communications Squadron – Williamtown detachment resides within 95 Wing and is Air Force's only specialist expeditionary communication and information systems squadron.

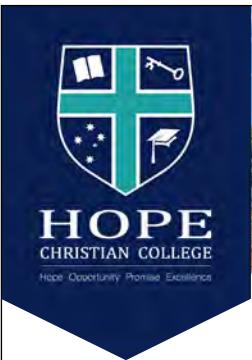
## AIR WARFARE CENTRE

In 2016, the RAAF established an Air Warfare Centre (AWC), headquartered at RAAF Base Edinburgh, to manage and apply all of the peripheral doctrinal and enabling tools necessary to sustain and project effective military air power. AWC comprises a number of specialist directorates: Integration and Innovation Directorate (IID), Information Warfare Directorate, Test and Evaluation Directorate (TED), Air Force Ranges Directorate (AFRD) and Tactics and Training Directorate (TTD). TTD is headquartered at Williamstown while the other directorates are based at Edinburgh. IID is a core AWC Headquarters function.

TTD is tasked with developing multi-discipline, high-end tactics across the Air Force through a combination of training, education and integrated exercises. It also conducts operational analysis to inform integrated tactics analysis to better enhance warfighter effects.



A pilot flies the No.76 Squadron Hawk 127 Simulator during a trial of eye tracking technology.  
Photo: CPL Brett Sherriff.



DISCOVER MORE ABOUT  
**HOPE  
CHRISTIAN  
COLLEGE**

Hope Christian College is a leader in Independent Schooling in the Northern Suburbs. Offering students a diverse range of subjects from Reception to Year 12.

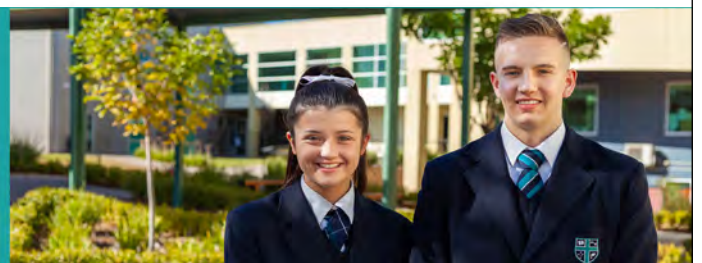
**Our desire is to develop and nurture each child in a caring Christian community.**

- Reception to Year 12 on one campus.
- All inclusive fees; excursions, camps, stationery, laptop program years 6-12.
- Door to door bus service
- New state of the art Reception to Year 3 building, including nature playground.
- Discount for Defence Force families.

📍 213 Yorktown Road,  
Craigmore, SA 5114

☎️ (08) 8287 1111

✉️ [www.hopecc.sa.edu.au](http://www.hopecc.sa.edu.au)



TTD executes its mission through No.88 Squadron and the Air Warfare School.

No.87 Squadron, the Air Force's mission intelligence squadron, a component of the Information Warfare Directorate, is based at Williamtown. The squadron is responsible for providing air intelligence and counter-intelligence analysis and combat targeting support to on-going Air Force operations. Personnel in the squadron comprise Air Intelligence Officer, Armament Engineer, Air Combat Officer, Air Intelligence Analyst Air Surveillance Operator, and administrative, computer systems support and logistics trade groups. The squadron has a total strength of 140 permanent and 30 reserve personnel, most are dispersed in seven Tactical Intelligence Flights integrated with all flying Force Element Groups and Combat Support Group.

Aircraft Research and Development Unit, a component of the TED, set-up Test and Evaluation (T&E) Flights at Williamtown, Amberley and Edinburgh to provide support and advice throughout the home-based weapon system life cycle. T&E services include developmental, acceptance and operational test and evaluation activities to ensure weapons system suitability, effectiveness, and performance.

AFRD has a synthetic training team at RAAF Williamtown which supports mission simulation for constructive and synthetic training exercises.

## OTHER KEY UNITS

Surveillance and Control Systems Program Office is responsible for Defence systems related to ground-based components of Air Defence Systems (Air Battlespace Management), Air Traffic Control services, Air Weapons and Test Ranges and related Air-Ground-Air communications and global positioning systems.

ADF Warfare Training Centre conducts individual training and education for Australian Defence Organisations, Australian Government agencies and selected overseas forces staff and assists with the training of headquarters' staff in the concepts of joint warfare. It conducts approximately 30 residential courses and training exercises annually.

Tactical Fighter Systems Program Office (TFSPPO) supports the Hawk 127 lead-in fighter operated by No.78 Wing; delivers Advanced Training and Testing services



for the Air Warfare Centre; manages contracted Joint Adversarial Training and Testing services provided to Air Force, Navy and Army; and coordinates support for the Combat Control capability within No.4 Squadron. TFSPPO was also responsible for supporting the F/A-18 Classic Hornet and continues to support Classic Hornet disposal activities.

Air Combat Systems Program Office is responsible for the sustainment and logistics management of the F-35A. It is focused on supporting Air Combat Group as it tests and refines the capability of Air Force's new fighters. Full responsibility for sustainment is being carefully transitioned from Joint Strike Fighter Division, the Canberra-based acquisition project office.

Airborne Early Warning and Control Systems Program Office provides in-service support and upgrades under Air 5077 Phase 5A and Phase 6 for the E-7A Wedgetail capability and is currently transitioning to also provide in-service support and Block Upgrade for the MC-55A Peregrine Airborne Intelligence Surveillance Reconnaissance & Electronic Warfare capability due to enter service in early 2023.

From humble beginnings, RAAF Base Williamtown has become a hive of military functions and combat capability that engender a sense of excitement and modern progression. Situated in the lower Hunter Valley and close to the cities of Newcastle/Lake Macquarie and Port Stephens, the base is a favoured post for many serving personnel. [W](#)



An Air Battle Manager from No.2 Squadron takes part in Exercise Virtual Flag at RAAF Base Williamtown.

Photo: CPL Brett Sherriff.



TOP A35-010 and A35-009, F-35A Joint Strike Fighters fly in formation with F/A-18 Hornets.

Photo: CPL David Gibbs.

ABOVE The E-7A Wedgetail and the F/A-18F Super Hornet fly aft of the KC-30A Multi Role Tanker Transport as they transit to the battle space as part of Operation OKRA.

Photo: CPL Brenton Kwaterski.



# PROPELLER-DRIVEN DESIGNS

THE L-049 CONSTELLATION, C-130 HERCULES AND P2V NEPTUNE WERE AMONG THE EXCEPTIONAL PRODUCTS OF LOCKHEED'S PROLIFIC DESIGN OFFICES IN THE 1940S AND 50S. WE RECOUNT THE ORIGINS OF THE 'CONNIE' AND 'HERC', ALONG WITH A LITTLE-KNOWN AIR FORCE/CIA VERSION OF THE NEPTUNE.



ABOVE Artist concept of the revised Model 44 Excalibur A in its proposed Pan American Airways livery. Image: LM Code One.

## CONSTELLATION AND C-69

Although it flew some six months before Skunk Works became an organised entity, Lockheed's Model L-049 Constellation program was headed by the two men who would soon become Skunk Works' Vice President and Chief Engineer, Hall L. Hibbard, and Chief Research Engineer, Clarence L. 'Kelly' Johnson, who had also co-designed and co-patented the airplane.

In late 1938, Lockheed had designed its first four-engine aircraft, the Model 44 Excalibur, aiming to sell a more modern airliner to Pan American Airways (Pan Am). Originally featuring twin vertical tail/rudder assemblies, a third tail was added and it became Excalibur A.

Pan Am was close to ordering the Excalibur A when the project was abandoned by Lockheed. The firm wanted to concentrate instead on its much-improved Model 049 Constellation program, created at the behest of 'Jack' Frye and Howard Hughes for Trans World Airlines (TWA). But first the US Army Air Force (USAAF) drafted the Constellation as a military transport, designated C-69.

On 20 September 1942, the War Department approved a USAAF contract for the production of two prototype C-69-LO and seven production C69-1-LO airplanes. Johnson and Hibbard applied for their patent a fortnight later.

Since Boeing's chief engineering test pilot Edmund T. 'Eddie' Allen already had flying experience with the XB-29 powered by the same engines used by the Constellation, he was loaned to Lockheed for the C-69's first flight. On 9 January 1943, the famed freelance test pilot completed a successful flight, from Burbank to Muroc Army Air Force Base. Several more test hops were flown that same day with Lockheed chief engineering test pilot Milo Garrett Burcham and Lockheed chief flight test engineer Rudy Thoren onboard. The airplane, civil registration NX25600, was an instant favourite with TWA and Hughes.

The C-69 type served well in World War II, and post-war some were refitted to serve as airliners for TWA. Eventually the Constellation morphed into numerous variants to serve all branches of the US military and a plethora of airlines.

## XB-30 BOMBER PROPOSAL

In response to a USAAF requirement for a heavy bomber (Secret Project MX-18), the Skunk Works began work on a variant of the Constellation. The XB-30 design featured a slightly revised fuselage with five twin 0.5-inch gun turrets and a 20mm tail cannon. Two centreline bomb bays, one forward and one aft of the wing carry-through structure, were

to accommodate four 2,000-pound bombs each. Model L-249-58-01 (the final configuration of the XB-30) never progressed past the design stage; only scale wind-tunnel models were ever built, mainly because Boeing had a huge lead with its XB-29 Superfortress (MX-17).

## THE USAF/CIA RB-69A

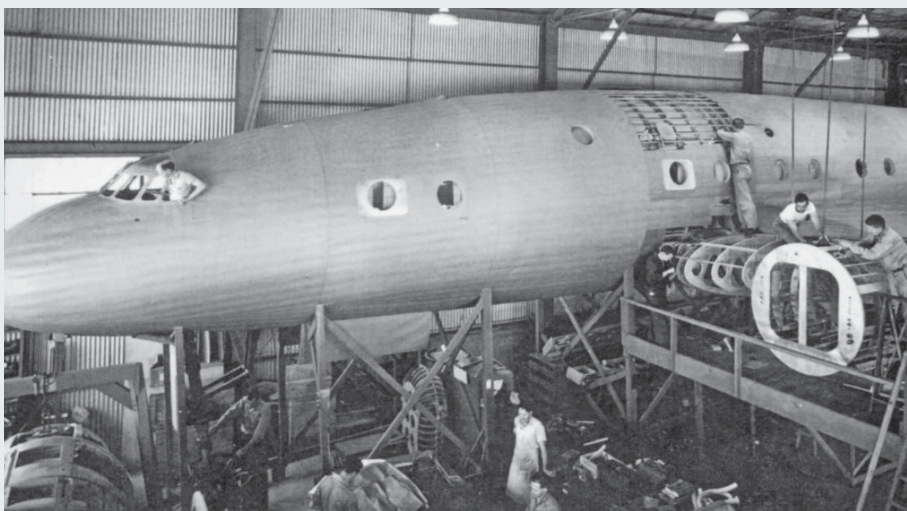
The RB-69A was a USAF variant of the Navy P2V-7, the final version of the P2V Neptune (called P-2 from 1962) antisubmarine patrol bomber built at Burbank. The service test Lockheed YP2V-7 (Lockheed Model 726-45-14) made its first flight on 26 April 1954 from Burbank.

Later that year, the Central Intelligence Agency (CIA) obtained five new P2V-7s, and contracted Skunk Works to convert them into P2V-7U/RB-69A variants for its private fleet of covert electronic intelligence (ELINT)/ferret aircraft. Skunk Works personnel, headed by Kelly Johnson and program manager Luther McDonald, modified the five new and two prior-service P2V-7s throughout 1954 and 1955. Later, to make up for operational losses, the CIA obtained and converted two Navy P2V-7s, one in September 1962 and one in December 1964, to Phase VI standard, and also acquired an older P2V-5 from the Navy as a training aircraft in 1963.

As each example was completed, it was parked on the flight line for post-production testing. As they differed little from the other Neptunes, nobody became suspicious of their true nature. Only their USAF markings and various ELINT equipment bulges hinted at anything different from their Navy counterparts. The modified aircraft were given the USAF designation RB-69A, and never received an official name or unofficial nickname.

All aircraft were painted in dark sea blue with USAF markings. Qualification test flights were done by lead aircraft at Edwards during 1955-56. In 1957 one P2V-7U was sent to Eglin Air Force Base (AFB), Florida for performance evaluation at low level and under adverse conditions.

From Burbank, two RB-69As were flown to the North Base area of Edwards AFB for equipment calibrations and flight crew training. Operational evaluations were then performed at Eglin AFB, from where they were ferried via the southern route to North Africa, and finally north to Wiesbaden, Germany. During 1955-56 they operated along the western border of



Russia, in part to catalogue its power grid.

In early 1957, the pair transferred to Hsinchu Air Base in Taiwan, from where they operated along the eastern border of China and elsewhere in South-East Asia. The CIA also sent the other two RB-69As to Hsinchu where by December 1957 they were given to a black ops unit, the 34th Squadron (better known as the Black Bat Squadron) of the Republic of China Air Force (ROCAF/Taiwan). Repainted with Taiwanese markings, they conducted low-level penetration flights into mainland China and South-East Asia for ELINT/ferret missions, including mapping China's air defence networks, and air-dropping agents, leaflets and supplies. Their last missions were flown in November 1966. The operations were given the CIA secret project name Cherry (soon changed to Project Wild Cherry, so as to not be confused with a different Project Cherry in which the CIA trained and deployed US Army teams of assassins).

Through the plausible deniability agreement between the US and Republic of China governments, the aircraft were manned by ROCAF/Taiwan aircrew on operational missions, and by CIA aircrew when ferrying from Taiwan or other operational areas to the United States. The surviving aircraft were mothballed at the Aircraft Maintenance and Regeneration Center at Kingman, Arizona.

Most of the 34th Squadron's missions remain classified by the CIA. A 1972 CIA internal draft historical manuscript entitled "Low-Level Technical Reconnaissance over Mainland China (1955-66)", covering 34 Squadron's black operations, is known to exist but remains classified until after 2022.



**ABOVE** C-69 full-scale engineering mock-up being assembled in Burbank. Photo: Author collection.



**BELOW** Lockheed Model L-049 on the day of its first flight, 9 January 1943, posing behind the one-off Lockheed Vega Model 5C (US Army Air Force UC-101). Photo: LM, Denny Lombard.



## C-69 SPECIFICATIONS

**CREW:** Four (pilot, co-pilot, flight engineer, navigator/radioman)

**PROPULSIVE SYSTEM:** Four 2,200-hp 18-cylinder Wright R-3350-35 Cyclone radial engines

**LENGTH:** 29m

**WINGSPAN:** 37.5m

**GROSS TAKEOFF WEIGHT:** 32.7t

**MAXIMUM SPEED:** 530kph at 10,000 ft

**MAXIMUM RANGE:** 3,860km

**SERVICE CEILING:** 25,030 ft

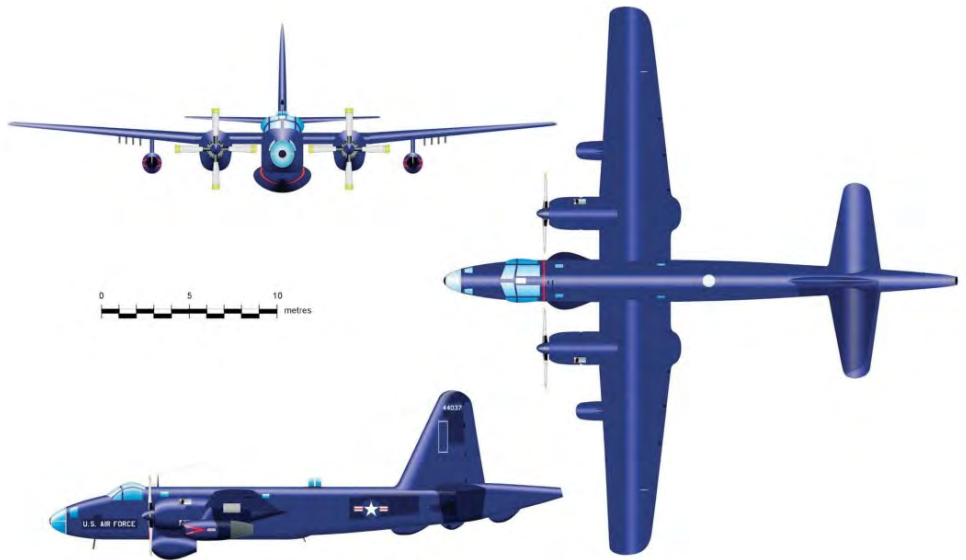


## BLACK OPS LOSSES

All five original RB-69As and one replacement were lost with all hands during CIA Taiwan-based operations: two crashed in South Korea and four were shot down over China. In January 1967, the two remaining replacement aircraft flew back to Naval Air Station Alameda, California, and were converted back to regular Navy P2H / P2V-7 anti-submarine warfare configuration.

The operational losses, totalling six aircraft and 82 crewmen, were:

- 25 March 1960: Aircraft serial 54-4040 crashed into a hillside during a low-level ferry flight from Hsinchu to a staging area in Kunsan, South Korea. All 14 crewmembers were killed.
- 6 November 1961: Serial 54-4039 was shot down by an SA-2 Guideline surface-to-air missile while flying a low-level penetration flight over Shantung province, People's Republic of China. All 14 crewmembers were killed.
- 8 January 1962: Serial 54-4038 crashed



ABOVE RB-69A number one in three view.



RIGHT RB-69A number one, later shot down by a Chinese MiG-17 in 1964. Photo: National Museum of the USAF.



## OPEN ARMS

Veterans & Families Counselling

A service founded by Vietnam veterans, now for all veterans and families



### SUPPORTING VETERANS AND THEIR FAMILIES

At Open Arms your wellbeing is our business. We offer free:

confidential counselling for individuals, couples and families  
 group programs  
 transition workshops  
 peer networks  
 suicide prevention training  
 education, self-help resources, and more...

To get support or find out more call or visit:  
 1800 011 046 | [OpenArms.gov.au](http://OpenArms.gov.au)



## SAFE ZONE SUPPORT

FREE ANONYMOUS COUNSELLING LINE  
 CALL 24/7: 1800 142 072

Safe Zone Support's specialist counsellors understand the military and can offer help to veterans and their families without needing to know who you are.

Calls to 1800 142 072 are answered 24/7, and are not recorded.

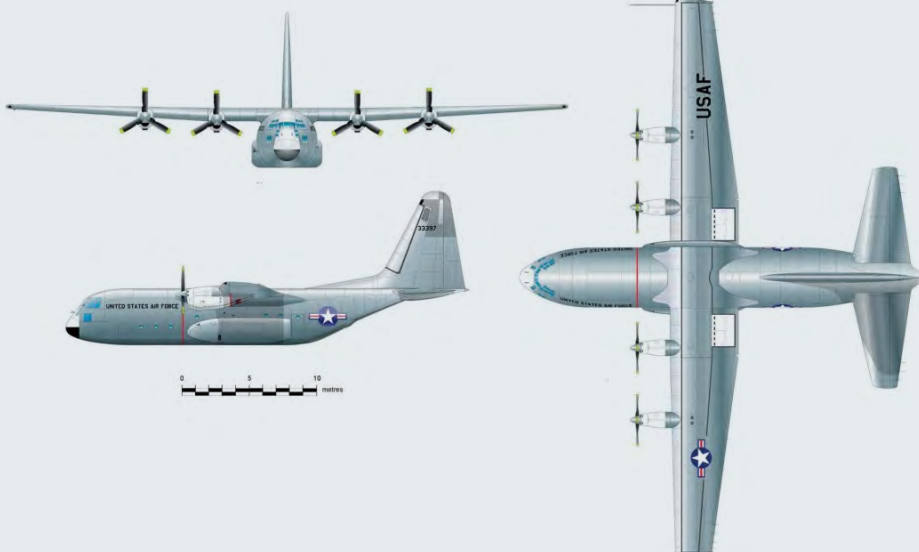
For more Information visit:  
[OpenArms.gov.au/safe-zone-support](http://OpenArms.gov.au/safe-zone-support)



**ABOVE** First flight of YC-130, from Burbank to Edwards. Photo: LM Code One.



**RIGHT** The first of two prototype YC-130 airplanes in three view. Artwork: Giuseppe de Chiara.



into the Korean Bay during an ELINT and leaflet-dropping mission. All 14 crewmembers were killed.

- 1 August 1962: One aircraft was shot down over the People's Republic of China, with 13 crewmembers killed.
- 14 June 1963: Serial 54-4041 was shot down near Nanchang by a People's Liberation Army Air Force (PLAAF) MiG-17PF Fresco flown by Wang Wenli. All 14 crewmembers were killed. (Some accounts date this incident at 19/20 June).
- 11 June 1964: Serial 54-4037 was shot down at night near Yantai (Shantung Peninsula) by a PLAAF MiG-17F, aided by an Iluyshin Il-28 Beagle which dropped flares to light up the airplane. All 13 crewmembers were killed.

Despite those losses, Project Cherry/Wild Cherry was for the most part successful, but the project remains one of most shielded activities of the CIA and Skunk Works. What those aircraft did, where they did it, identities of crewmembers, and even their primary command (Strategic Air Command, Tactical Air Command, or Air Defense Command) all remain classified.

The RB-69A was actually a stopgap aircraft. The CIA was waiting for Skunk Works to produce its new jet spyplane. That aircraft, the U-2, will be the subject of part six of our series.

## YC-130 HERCULES

Not all Skunk Works aircraft are beautiful triple-sonic air vehicles that fly 30km above the planet. Most are exceptional airplanes, nonetheless. The esteemed

medium-class C-130 Hercules cargo transport has been in continuous production since 1955. More than 70 versions have been produced for all branches of the US Armed Forces and 62 other nations.

Designed by Willy Hawkins, with Dick Pulver as chief engineer, the 'Herc' began as the TDN-206 (later Model 82 Program) for the USAF's tactical medium-class cargo airplane competition. The 130-page request for proposal was prepared and submitted in January 1951. Lockheed won the contract and a USAF order for two prototype YC-130 airplanes was approved in August 1953 under USAF Aircraft Research and Development Command Project MX-1704. A patent was applied for in October 1953, with Kelly Johnson, Willy Hawkins Jr and Gene Frost listed as its inventors.

As the first YC-130 (Model 032-44-01) initially served as the structural static test article, the second example, USAF serial 53-3397, was the first to fly. On 23 August 1954, pilot Stan Beltz and co-pilot Roy Wimmer took off from the Lockheed Terminal in Burbank, California. Dick Stanton and Jack Real accompanied them as flight engineer and flight test engineer, respectively, and the airplane landed at Edwards Air Force Base after a one-hour flight.

The first pre-production prototype (serial 53-3396) made its first flight on 21 January 1955, again from Burbank to Edwards, with Roy Wimmer, Joe Ware Jr, and Jack Real at the controls.

Following the two YC-130s built at Burbank, the first C-130A Hercules



**ABOVE** Patent applied for on 1 October 1953.

## YC-130 SPECIFICATIONS

**CREW:** Three (pilot, co-pilot, flight test engineer)

**PROPULSIVE SYSTEM:** Four axial-flow, 3,250-shp Allison T56-A-1 turboprop engines with three-bladed Curtiss Electric propellers

**LENGTH:** 27.5m

**WINGSPAN:** 40.4m

**MAXIMUM TAKEOFF WEIGHT:** 56.3t

**MAXIMUM SPEED:** 616kph at 20,400 ft

**MAXIMUM RANGE:** 5,174 km

**MAXIMUM CEILING:** 41,300 ft

## RB-69A SPECIFICATIONS

CREW: 14 (pilot, co-pilot, flight engineer, navigator / radioman, and 10 ELINT systems operators)

PROPULSIVE SYSTEM: Two 3,500-hp Wright R-3350-32W Cyclone 18-cylinder, turbo-compound, radial piston engines, and two axial-flow, non-afterburning, 3,400-lbf Westinghouse J34-WE-36 turbo-jet engines

LENGTH: 27.9m

WINGSPAN: 31.65m

GROSS TAKEOFF WEIGHT: 36.2t

MAXIMUM SPEED: 644kph at 14,000 ft

SERVICE CEILING: 22,400 ft

MAXIMUM RANGE: 6,035km (estimated)

ARMAMENT: None

PAYLOAD: Classified

(delivered in 1956) and subsequent aircraft were built at the Lockheed Martin facility in Marietta, Georgia. The current production version is the C-130J Super Hercules.

Willy Hawkins called the C-130 an aircraft "designed right the first time". It is a time-proven airframe, propelled by a time-proven powerplant, and a truly Herculean transport aircraft. On 11 December 2015, Lockheed Martin delivered its 2,500th example: an HC-130J Combat King II, an extended-range version of the C-130J Hercules, designed to operate to austere airfields and denied territory for expeditionary, all weather personnel recovery operations. **W**

*Edited excerpts and photographs are used (with permission) from The Projects of Skunk Works by Steve Pace (Voyageur Press).*



**ABOVE** A No.37 Squadron C-130J Hercules is marshalled into a parking position at RAAF Base Darwin after a sortie during exercise Diamond Storm. Photo: CPL Craig Barrett.



**LEFT** A C-130J Hercules from No.37 Squadron flies over Lake George during a training exercise. Photo: SGT Brett Sherriff.

## Australia's leading STEM provider

Build your knowledge and understanding of STEM and STEAM with our unique and exciting educational programs for all ages.

<https://onegiantleapfoundation.com.au/>



# STARS, SEXTANTS AND SECOND HANDS

A LOOK BACK IN TIME TRACES  
THE INSPIRATION FOR A COLLECTION  
OF PRECISION WATCHES COMMISSIONED  
TO COMMEMORATE THE AIR FORCE  
CENTENARY.

**T**HE ROYAL AUSTRALIAN AIR FORCE has played a significant part in guiding Australia to our place in the world today and to commemorate its centenary, Australian luxury watch brand Bausele collaborated with Air Force to craft a collection of commemorative precision timepieces.

The Air Force 2021 Centenary watch collection is inspired by the timepieces that are the airborne equivalents of the marine chronometer used to determine longitude.

During World War II, the British Armed Forces strove to improve navigation precision and the development of highly technical precision watches facilitated the use of astronavigation in military aviation.

By the late inter-war years, commercial airlines flew at night and in adverse weather using navigational aids, homing devices and organised ground support. However, in 1937 Royal Air Force (RAF) Bomber Command determined they were 'unable to operate except in fair weather'. The bomber did not always get through, nor could the crew reliably return to base. During the first years of WWII only five percent of bombs were dropped within five miles of the target and three out of four Coastal Command aircraft failed to find their convoy.

The science of aviation navigation was largely established but had yet to make it from textbooks to military cockpits. Early military crews commonly operated in salubrious skies such as Egypt and decision makers had forged their understanding of 'long-range' during World

War I. For a Royal Flying Corps airman assisting the army, long-range had meant a front of 10 miles and an aerodrome within 30 miles.

Why navigation received so little attention is still debated, but crews hunting U-Boats and pilots looking for tactically concealed turning marks were more concerned with the question of 'where'. Navigation is the artful science of getting to the right place, along the right route at the right time. It starts with knowing where you are and when you're there. Keeping a grip on the art would have been difficult when aviators with dodgy clocks had to wrangle sextants





in the slipstream of an open cockpit. Similarly, the comfort of a navigation table wouldn't make inconsistent speeds and uncertain winds match up for useful dead reckoning orientation.

Plexiglass became available in commercial quantities just in time to shield the navigators whose distinct profession was established in 1937. Lightweight and mouldable, the optical and manufacturing qualities of acrylic glass saw cupolas sprouting up and down aircraft. That afforded aviators the chance to use the new Mk II Astrocompass. Those sextants had bubble spirit levels for alignment, bearing and declination scales for angular measurements and were used with an almanac and star chart in a newly simplified method of calculation.

What proved difficult was getting an accurate time and getting aviators to record the time. Marine chronometers couldn't withstand the vibration, and damp, salty air wreaked havoc with early navigator watches. While the Ministry of Defence (MoD) was laying down new specifications for timepieces, Group Captain 'Dickie' Richardson, RAF was laying down Lewis Carroll for aviators. It's fortunate the task of overhauling training materials landed with someone so dedicated to readability, functionality and sneaky departure from protocol. In 1941, Richardson's revised AP1234 *Air Navigation* appeared complete with chapter headings from Carroll's *Alice in*



**ABOVE** Astro Compass Mk II.



**LEFT** Bausele Air Force Centenary 2021 Aviators.



**BELOW LEFT** The Link Celestial Navigation Trainer (CNT) was developed for RAF navigators involved in cross-Atlantic ferry flights. Flight crew were positioned in an enlarged fuselage with a synthetic night sky above and ground features projected onto a screen below. The instructor could introduce turbulence and other challenges. The RAAF installed a CNT at RAAF Air Base East Sale in 1944.



**OWN  
AVIATION  
HISTORY**

 **BAUSELE**

*Wonderland* and a woodcut illustration featuring the motto 'Man is Not Lost'.

Richardson became the Chief Navigation Officer for Coastal Command and formulated a drill dictating the minimum hourly input of activities by a navigator. Just when the technical capacity of MoD's watches was catching up with Alice and Dickie, aircraft radar aids presented new problems. Watch movements were suffering from magnetic interference and a host of workarounds were implemented at yearly watch service while a permanent solution was sought.

In his autobiography, *A Navigator's Tale*, RAAF navigator Roy Shallcross explains how an astrocompass position 'fix' was taken after stepping up to the astrodome. "The sextant incorporated a clockwork mechanism that registered the elevation every two seconds and at the completion of the two minutes, the sextant indicated the average elevation of the 60 readings. It was essential that the correct time – to the second – was available and the time of the sighting recorded. That was possible because we had been issued with Omega wristwatches at Mt Gambier, which were excellent timekeepers – mine to the second."

Shallcross' Omega watch is still known in the horology world by the RAF store reference number 6B/159. That generation of timepieces is the design and technical inspiration for the Bausele Airfield Hercules model, which carries an embossing of a Hercules transport aircraft on the case back.

The success of scientific techniques, precision equipment and methodical application is illustrated by the progressive performance of Bomber Command. In the spring of 1942, just 23 percent of aircraft despatched in fair weather dropped bombs within three miles of the target. By 1945, more than 95 percent achieved that success with a substantial proportion of bombs falling within a mile of the target.

The 6B/159 timepieces remain impressive, but they were eclipsed in 1949 by one of the most famous watches in history: the Mk 11 navigator wristwatch 6B/346. That watch had several variants but the unifying gamechanger was a Faraday cage of soft iron shielding the movement from magnetic interruption. In 1952, the Mk 11 set another standard, that time for visual acuity. To improve clarity in unfavourable light conditions, a triangle replaced the 12 and a shorter,

## SWISS TECHNOLOGY FOR AN AUSSIE LIFESTYLE

The Bausele watch brand was born out of the passion Frenchman Christophe Hoppe had for his adopted home; he felt Australia had everything life needed – except a premium watch brand. Formerly a chief financial officer in the Swiss watch industry, Christophe was surprised to see wrists sporting only the same watches he'd seen in Switzerland. He gave up his corporate job and combined his two passions, designing watches and the Australian lifestyle, to create Bausele, "the first premium Australian watch brand with Swiss technology". The name is derived from 'beyond Australian elements'.

"To produce a watch for the Australian lifestyle is like preparing for the worst that could happen. It has to be waterproof for coastal living, dust resistant for inland and shock resistant for an active lifestyle," Christophe says. "It has to go from surfboard to boardroom within a few hours. Australia has so much to offer, the country has a great appeal around the world. We want to represent the best of Australia."

By 2015, Bausele was the first and only Australian brand to be exhibited at Baselworld, the largest watch and jewellery fair in the world. The company's growth saw it become the



ABOVE Christophe Hoppe (right) with Bausele CEO Arron Coote.

supplier of the Army Intelligence Corps and Special Forces and expand global distribution to include France, USA and Japan while selling online to more than 40 countries.

In 2020, Bausele was chosen to create the official watch to mark the Air Force centenary.


Christo's meticulous design sensibility and knowledge of, and access to, state-of-the-art Swiss technology underlies the success of Bausele. He considers each component and designs watches that meet industry best standards and then offers them at prices that deliver affordable luxury to a loyal following.

thicker hour hand was introduced.

All timepieces are now engraved with the broad arrow ordnance mark.

The Bausele Aviator and Aviator Mk II models feature the same anti-magnetic Faraday cage technology and the Air Force 2021 committee took the dial a few steps further into the modern design age. The tachymeter on the blue and white colourways sits at 21 minutes to commemorate the centenary year. The case back of the Aviator features a piece of one of Australia's first F/A-18A Hornet fighter aircraft.

The RAAF has not commissioned a timepiece for 70 years and Bausele is honoured to offer the Air Force 2021 Centenary collection. As the

RAAF looks to space, the collection commemorates aviators of the past who looked to the stars to guide them. Now. Then. Always. 





# 100 SQN

F L I E S   A G A I N

---

THE LEGACY OF A WWII BOMBER SQUADRON LIVES ON IN A NEW SQUADRON FORMED TO MAINTAIN THE RAAF'S FLYING HERITAGE ASSETS.



A Spitfire during an aerial display during the Temora Air Force Centenary Showcase 2021.  
Photo: CPL Kylie Gibson.

## POINT COOK BASED AIRCRAFT

(VH civil registration is followed  
by military serial, where applicable)

- Sopwith Pup VH-PSP
- Sopwith Snipe VH-SNP
- RE.8 VH-OTF / RE8-1 0003
- Harvard VH-HVD / NZ1075
- CA-25 Winjeel  
VH-FTS / A85-439
- DH.82A Tiger Moth  
VH-AWA / A17-692
- P-40E Kittyhawk A29-90
- CA-18 Mustang  
VH-SVU / A68-170
- CT-4A Airtrainer  
VH-NZP / A19-077

## TEMORA BASED AIRCRAFT

- DH.82A Tiger Moth  
VH-UVZ / A17-691
- Ryan STM VH-RSY / 474
- Lockheed Hudson  
VH-KOY / A16-112
- CAC Boomerang  
VH-MHR / A46-122
- CAC Wirraway VH-BFF / A20-653
- Spitfire Mk.VIII  
VH-HET / A58-758
- Spitfire Mk.XVI VH-XVI / TB863
- de Havilland Vampire  
VH-VAM / A79-617
- Gloster Meteor F8  
VH-MBX / VZ467
- English Electric Canberra  
TT.18 VH-ZSQ / WJ680
- Cessna A37 Dragonfly  
VH-XVA / 68-10779
- CAC Sabre VH-IPN / A94-983

**IT IS APPROPRIATE** that before the RAAF Centenary year ends on 31 March 2022, our museum story this edition reviews a significant development in the preservation of the RAAF's heritage through the formal establishment of an operational heritage flying squadron.

No.100 Squadron (100SQN) was reformed on 1 January 2021 to take ownership of the Temora Aviation Museum flying assets, generously donated to the RAAF by museum founder David Lowy, and to manage the flying craft of the RAAF Museum Heritage Flight.

The choice of number recognises the RAAF centenary and also preserves the legacy of 100SQN RAAF, which served with distinction during World War II as a Beaufort bomber squadron. The Air Force 100 motto 'Then. Now. Always' will appear on the 100SQN unit badge.

Headquartered at RAAF Base Point Cook, Victoria, the RAAF's 'spiritual home' and site of the RAAF Museum Heritage Flight, 100SQN is charged with maintaining the RAAF's flying heritage assets and exercising command and control of the flying operations conducted at Point Cook and from its second base at Temora, NSW. During WWII, Temora was home to No.10 Elementary Flying Training School, operating Tiger Moths.

While the non-flying elements of the

RAAF Museum now come under History and Heritage Branch, 100SQN is part of Air Academy within Air Force Training Group under AIRCDRE Greg Frisina. The squadron's Commanding Officer, WGCDR Philip Beanland, was formerly Executive Officer of Headquarters Air Academy.

"I feel extremely privileged to be the inaugural commander of a professional team working with these precious national artefacts," he said. "No.100 Squadron looks forward to safely displaying a well-preserved fleet to the Australian public over a wide range of settings and venues. The heritage fleet of No.100 Squadron will continue to recognise previous generations and their



**BELOW** Hudson bomber.  
Photo: FLTSGT Ricky Fuller.



Temora Historic Flight Hudson bomber with two Boomerangs.  
Photo: CPL Kylie Gibson.





**TOP** The Canberra bomber's return to the air at Temora, 28 June 2021.

**ABOVE** Flight Lieutenant Darren Crabb in the cockpit of the Canberra.

service to our country and inspire the next generation to follow in their footsteps."

On 28 June, FLTLT Darren Crabb, in what he described as a career highlight, took 100SQN's English Electric Canberra bomber on its first flight in 11 years, following restoration. Interestingly, that particular Canberra served with No.100 Squadron, Royal Air Force, in Britain until 1991. Apart from three WB-57s (US licence-built Canberra variants) flown in the US by NASA, the 100SQN Canberra is the only airworthy example in the world. **W**

*Images courtesy Department of Defence.*

## THE ORIGINAL 100SQN



Australian-built Beaufort bombers of 100SQN RAAF en route to bombing a target in the Wewak area, Papua New Guinea, 20 January 1945. A9-557 (far left) was battle damaged during the mission and crashed landed; it is now preserved at the Australian War Memorial.

No.100 Squadron RAAF was formed as a torpedo/bomber squadron at Richmond, NSW, in February 1942 from the nucleus of 100SQN, Royal Air Force (RAF), which had been decimated the month before during the Malayan campaign against the Japanese.

A bomber and maritime patrol squadron, 100SQN RAAF moved to Laverton, Victoria and trained on Australian-built Bristol Beauforts, which it then took to war in Papua New Guinea. The squadron conducted several successful missions throughout the war, including anti-submarine patrols off Queensland, attacks on coastal shipping around Milne Bay and operations in the crucial Battle of the Bismarck Sea in March 1943. 100SQN was disbanded a year after war's end.

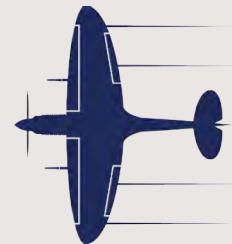
The RAF squadron from which 100SQN was originally formed still operates Hawk jet trainers from RAF Leeming, UK.

## DONATE NOW TO KEEP AUSTRALIA RESILIENT

We are no longer just a wartime association. In our 60th year we are looking at what we do to maintain Australian resilience, and how you can contribute to that mission.

We are firmly focused on the future. That means funding research and activities that make a step- change difference to Australian sovereign capabilities and resilience. We do this by continued and active maintenance of the Spitfire Memorial Defence Fellowship, as well as bringing other selected projects to life.

We continue to preserve the memory of the men and women who served in World War II, and the founders of the Spitfire Association, carrying their spirit forward as we focus on the future.



### CARRYING THE SPIRIT FORWARD

How can you contribute to Australian resilience? Find out at: [www.spitfireassociation.com/smdf.php](http://www.spitfireassociation.com/smdf.php)



# EDWARDS VC:

## A DISTINGUISHED CAREER

AIRCDRE SIR HUGHIE IDWAL EDWARDS WAS THE FIRST, AND SOLE SURVIVOR, OF THE THREE AUSTRALIAN AIRMEN AWARDED THE VC DURING WWII, AND THE MOST HIGHLY DECORATED AUSTRALIAN OF THE WAR.

**SIR HUGHIE IDWAL EDWARDS VC**, KCMG, CB, DSO, OBE, DFC, a Western Australian of Welsh heritage, was born in 1914 and joined the RAAF in 1935. After training at Point Cook, he was granted a short service commission with the Royal Air Force (RAF) in the UK. Captaining the new Blenheim light bomber, he got to know the aircraft intimately over several years. He also knew danger all too well. In 1938, he bailed out of an uncontrollable Blenheim at low altitude, only to have his parachute snag on the aircraft's aerial mast. He was still attached when the aircraft crashed. Critical head and leg injuries grounded him for nearly two years, until he pressured the authorities to clear him for flying. He walked with a permanent limp.

In May 1941, Acting WGCDR Edwards took command of No.105 Squadron, RAF. He was awarded a Distinguished Flying Cross for leading a daring mast-height attack on eight German merchant vessels anchored near The Hague on 15 June, Edwards heavily damaging one.

His Victoria Cross award came after an operation on 4 July 1941, when he led a dozen Blenheims on a low-level daytime attack on the heavily defended German port city of Bremen. En route over the North Sea, they were spotted by enemy ships which alerted the defences, removing the element of surprise.

To quote from Edwards' VC citation: *Undaunted by this misfortune he brought his formation 50 miles overland to the target, flying at a height of little more than 50 feet, passing under high-tension cables, carrying away telegraph wires and finally passing through a formidable balloon barrage. On reaching Bremen he was met with a hail of fire, all his*

*aircraft being hit and four of them being destroyed. Nevertheless, he made a most successful attack, and then with the greatest skill and coolness withdrew the surviving aircraft without further loss.*

Later that month, Edwards took his squadron of 18 crews to the besieged island of Malta, from where they attacked Italian convoys on their way to Libya. After two months only three of his crews had survived.

A second six-month stint commanding No.105 Squadron, now flying the Mosquito, was followed in 1943 by



**ABOVE** Edwards with Prime Minister John Curtin at RAF Station Binbrook, 1944. Photo: Australian War Memorial.

a posting as Officer Commanding RAF Station Binbrook, England, home of the Lancaster bombers of No.460 Squadron RAAF.

After a distinguished 28-year career in the RAF, including service as aide-de-camp to the Queen and Director of Establishments of the Air Ministry, Edwards retired in 1963.

He was knighted in 1974 upon his appointment as Governor of Western Australia, but retired from the post due to ill health in April 1975.

Shortly after his death in 1982, his widow Dorothy donated his orders and medals to the Australian War Memorial. There they were placed on display near the Lancaster bomber 'G for George' which had flown from RAF Binbrook during his tenure at the base. Below the bomber was a bronze bust of Edwards. In 1999 his biography, *Hughie Edwards VC: The Fortunate Airman*, was written by Arthur Hoyle DFC, a pilot with No.460 Squadron. **W**

*Mike Nelmes*



**ABOVE** *The Episode in which Wing Commander Edwards Won his VC* by Ray Honisett, oil on canvas, 1982. Image: Australian War Memorial.

# RAAF MUSEUM POINT COOK

The RAAF Museum, located at Point Cook, is home to an amazing range of historic military aircraft.

The Museum has a vast collection of historical material on show, including several hangars with static aircraft. It offers visitors an exciting experience and insight into the history of the Royal Australian Air Force.

Models, books, patches, clothing and mementos can be purchased at the Museum shop.



**ENTRY TO THE RAAF  
MUSEUM IS FREE**

**OPENING HOURS:**  
Due to COVID-19, please check our website and Facebook page for reopening and booked attendance requirements.







(03) 7301 5202 • [www.airforce.gov.au/raafmuseum](http://www.airforce.gov.au/raafmuseum) • Email: [RAAF.MuseumInfo@defence.gov.au](mailto:RAAF.MuseumInfo@defence.gov.au) • [facebook.com/RAAF.Museum](https://facebook.com/RAAF.Museum)



A G A I N S T T H E

# WIND

## DEFENCE SCIENCE AND TECHNOLOGY GROUP USES WIND TUNNELS TO TEST DEFENCE ASSETS FROM SUBMARINES TO FIGHTER AIRCRAFT.

**F**OR MANY DECADES, defence scientists have used wind tunnels to support major Defence programs such as the Collins Class Submarine, Joint Strike Fighter and F/A-18 Super Hornet. Defence Science and Technology Group (DSTG) operates two industrial-scale wind tunnels at Fishermans Bend in Melbourne.

Its low-speed wind tunnel (LSWT) has been in operation for 80 years while the transonic wind tunnel (TWT) has been running for 21 years. Researchers can dial up wind speeds up to 100m/s (195kts) in the LSWT, while items placed in the TWT can be battered by super-sonic air flow from Mach 0.3 to Mach 1.4.

The LSWT is used extensively to test a variety of air, maritime and land-based

equipment. It has a working section 2.7m wide, 2.1m high and 6.6m long where models can be mounted in various ways depending on the requirements of the test.

The TWT is used to study high-speed aerodynamic flows around aircraft and to investigate how those flows interact with the stores and other attachments carried and released from the wings and fuselage. Studies are conducted using sub-scale models.

DSTG's experimental and computational aerodynamics science and technology effort is led by the Aerodynamics Group. Bruce Woodyatt, Aerodynamics Group Leader since 2008, has seen significant changes in aerodynamic research over his three decades in defence science, and the wind tunnels have been key.

### LSWT GENESIS

In 1937, H.E. Wimperis (former Director of Scientific Research, British Air Ministry) visited Australia to advise the government establishing an aeronautical research facility.

"Australia will wish to know the degree to which home-produced products can safely be used in substitution of materials that have to be imported, how far it is safe to adopt novel methods of manufacture which may suit local conditions, and most important, to learn promptly the cause of any failure during manufacture, or use, of any aircraft component, or of the aircraft as a whole," Wimperis stated.

"Moreover, if for local reasons any modifications are desired in a given design for aircraft, a study must be



Model of the F-35A mounted on the sidewall of the DSTG Transonic Wind Tunnel with model of the GBU-31 (V1) weapon near carriage position.

made in advance of the effects of such modifications. Sometimes the effects may be predicted by calculation and sometimes they cannot; in the former case an experimental confirmation is usually found desirable, whilst in the latter, experiment is the only means available at arriving at the answer."

Wimperis recommended establishing a research centre that included a wind tunnel "large enough and fast enough to match modern aircraft design and a smaller fast one to undertake special tasks". He based his technical advice on the prediction that aircraft would never travel faster than 350 miles per hour (463kph) unless some new form of aircraft propulsion were discovered. The maximum speed of Defence's new F-35 aircraft is 1,200 mph (1,931kph).

Spurred on by the growing threat of war in the late 1930s, the government allocated ample (and uncustomary) funding for facilities, and building on the chosen 10-acre (4ha) Fishermans Bend site commenced in August 1939. The first laboratories were ready for occupation less than a year later, and the LSWT was commissioned late in 1941, two days before the attack on Pearl Harbour.



**BELOW** A section of the low-speed wind tunnel being transported to Fishermans Bend.

## DEVELOPMENT ROLE

According to Bruce Woodyatt, the LSWT played an important role in the halcyon days of Australian aircraft development at Fishermans Bend. Out the back of the current DSTG site, a runway was used by the government aircraft factories of the day to prepare and deliver their flying products.

"Both the low-speed and transonic wind tunnels are critical sovereign capabilities for Defence and many a RAAF platform and system has been tested here," Woodyatt says. "Both facilities have played an integral part in how the ADF has evolved, the Air Force in particular. This is set to continue, with the wind tunnels central to some significant Defence programs of work."

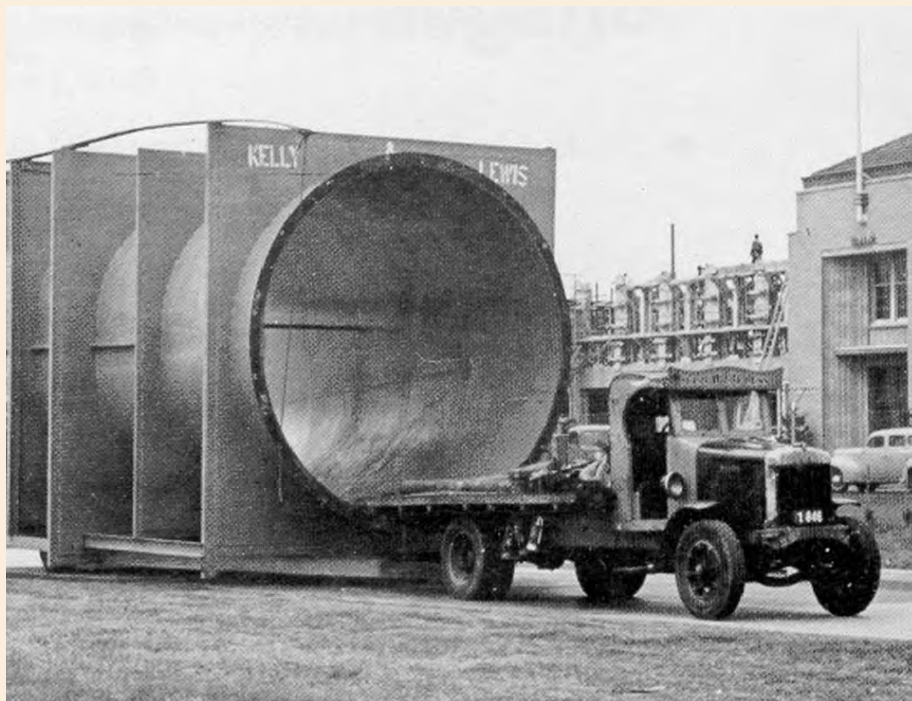
But it's not just airborne platforms that are being scrutinised in the wind tunnels. "Air is a fluid, water is a fluid – if you can take into account their differences then you can put submarines and boats in the wind tunnels," says Woodyatt. "As long as you take care of the physics, the wind tunnels can often expose things that may not have been identified in water."

The converse is also true. "The Aerodynamics Team uses the DSTG water tunnel at various times to investigate flows around aeronautical structures by studying the movement of dyes separating from models at critical structural locations."

The wind tunnels have been busier than ever in recent times, with ever more complex computational models validated through wind-tunnel experimentation. The team has been expanding under the leadership of Adam Blandford (Discipline Lead - Wind Tunnel Operations) to cope with the demands.

Industry partner QinetiQ is also a key contributor to the on-going sustainment of the wind-tunnel capability.

"They are on-site here, literally across the road, and are an important resource to tap into with a breadth of expertise in model design, photography, instrumentation and electronics," says Woodyatt. "And in recent years QinetiQ has been integral to the operation and maintenance of some aspects of the wind tunnels. The QinetiQ relationship continues to grow to support the growing dependency on the facilities."



## INDUSTRY & ACADEMIA

The Aerodynamics Group has a rich history of supporting locally developed technology. A recent example is the design of the Boeing Airpower Teaming System, also known as Loyal Wingman, which was aided by wind-tunnel analysis.

The Loyal Wingman is a stealthy, unmanned fighter designed by Boeing with DSTG and RAAF collaboration to operate alongside Hornets and F-35s in the world's first fifth-generation air force. It will be the first aircraft developed in Australia for nearly 50 years and the first fixed-wing aircraft Boeing has ever developed outside the USA. Access to wind-tunnel facilities has been cited by Boeing as one of the reasons Australia was chosen as the place to design and develop the Loyal Wingman.

"There is no other facility in Australia that can do what our transonic wind tunnel can do," says Woodyatt. "That is attractive to industry, which can do research locally rather than having to go off-shore."

Two smaller 'research scale' tunnels at the Fishermans Bend site, a scaled-down section of the low-speed wind tunnel and the water tunnel, are often used by university undergraduates for research programs. [W](#)



The Boeing Loyal Wingman in the DSTG low-speed wind tunnel. Photo: DSTG, Department of Defence (approved by Boeing).



The Loyal Wingman conducts its first flight. Photo: CPL Craig Barrett.



Captain Paul Gulotta USAF spent two years working with DSTG, performing PIV image calibration. Photo: Sian Human, DSTG.

# COLLABORATION EXPANDS TUNNEL VISION

## DSTG HAS DEVELOPED AN EXCITING NEW IMAGING CAPABILITY.

**A** **TWO-YEAR INTERNATIONAL** engineering placement with Defence Science and Technology Group (DSTG) has enabled Aerospace Division's Experimental Aerodynamics team to achieve an Australian first.

Thanks to the dedication of Captain Paul Gulotta of the US Air Force, DSTG has successfully demonstrated Particle Image Velocimetry (PIV) in the transonic wind tunnel (TWS) at Fishermans Bend. Building on the development of a similar capability in the low-speed wind tunnel, PIV adaption to the TWS enhances Australia's ability to ensure the

safe carriage and release of stores by fighter aircraft.

Gulotta is one of just eight US personnel selected in 2018 to take part in the Engineer and Scientist Exchange Program, which promotes international cooperation in military research, development, test and evaluation between the US and its allies. Given his background in experimental aerodynamics and hypersonics, he was the perfect match for a request from DSTG for an engineer to help with extending the PIV capability.

Gulotta arrived in Melbourne in July 2019 to begin his two-year placement. Despite initially feeling somewhat

intimidated by the depth of knowledge of his new colleagues in the Experimental Aerodynamics team, he says his own research background stood him in good stead and he was quickly made to feel welcome at Fishermans Bend.

"It's been an amazing experience," Gulotta says. "Our branch, in particular, has such an enormous wealth of experience in the experimental aerodynamics regime – more PhDs than not, and if they don't have a PhD they have 20 years of experience in this area. But with my background having a masters in experimental aero, I found I hit the ground running and was almost instantly part of the team."

## HARS Aviation Museum

Highly acclaimed collection of lovingly restored aircraft as well as a selection of Australia's Aviation Heritage aircraft. An incredible tour with a team of knowledgeable tour guides who provide outstanding commentary on your visit.

### Over 40 aircraft including:

- DHC-4 Caribou (A4-210, A4-234)
- F-111C (A8-109)
- PBV-6A Catalina
- AP-3C Orion (A9-753)
- CAC CA-27 Sabre (A94-901)
- P2V-7 Neptune (A89-273)
- Douglas C-47 (A65-94, A65-95, A65-90 - now N2-90)

Well stocked shop with memorabilia from aviation history

Award winning café with great coffee, breakfast & lunch menus. Memorable private functions & kids birthday parties

High-tech conference & meeting rooms with state of the art equipment



Photo: Howard Mitchell



Open 7 days from 9:30am – 3:30pm | 02 4257 4333 | hars.org.au | Shellharbour Airport, Albion Park Rail NSW

## LASER FOCUS

Gulotta explains that PIV is a technique which uses lasers to build a picture of air flow behaviour around objects. The object used to test and validate the PIV technique in the TWS was a model of a GBU-31— a Mk 84, 900kg ballistic warhead fitted with a Joint Direct Attack Munition guidance and control kit.

“We had existing hardware for particle image velocimetry which we used in the Low Speed Wind Tunnel,” Gulotta says. “My job was to adapt that hardware for the Transonic Wind Tunnel environment, which was a pretty big engineering challenge.”

“We started with a literature review, looking at transonic tunnels around the world to figure out what an appropriate design for the system might be, and then interviewed a number of people from those facilities to figure out the ins and outs of a potential system. From there, we were able to develop a capability concept and then go through a whole bunch of safety documentation to implement the laser and to get approval to use aerosol particles in the transonic wind tunnel.”

The project culminated in a series of qualification tests that began in April and ran for about a month and a half.

Crucially, the work is not purely theoretical – it has direct relevance to an ongoing collaborative effort to clear weapons for carriage by the F-35A Lightning II. Australia and the US are working together on that endeavour under what is known as the F-35A Aircraft Stores Compatibility Project Arrangement.

According to Peter Manovski, who supervised the PIV project, the placement was a huge success not only because of Gulotta’s outstanding engineering work but also due to the professional qualities he brought to the Experimental Aerodynamics team.

“We’ve been really fortunate and really proud to have Paul on board,” says Manovski. “He’s really brought a different perspective from his military training and leadership training. He’s instigated a few initiatives that we have continued here that are separate to the research, like helping us with project management. It’s been really great in terms of his attitude to work – he’s always willing to help out. We wish he could have stayed longer.”

After leaving DSTG at the end of July, Gulotta returned to a posting at Hill Air Force Base in Utah. [W](#)

## THE PARTICLE IMAGE VELOCIMETRY METHOD

Particle image velocimetry (PIV) is a flow-measurement technique that captures high-resolution images of small aerosol particles (approximately 1µm) within a moving fluid in order to track the velocity of that fluid.

A series of mirrors direct a high-powered laser beam through sheet-forming optics illuminating a plane surrounding the geometry of interest. Laser pulses perform a function similar to a camera flash, illuminating aerosol particles within the flow field of interest. Synchronised with the laser pulses, a PIV camera captures pairs of images in quick succession as short as 800-nanosecond intervals.

Image pairs are compared using cross-correlation algorithms to identify the direction and magnitude of particle displacement between two images. With knowledge of image scale, time between images and the particle displacement, a 2D velocity map can be produced that details the flow behaviour surrounding the geometry of interest.

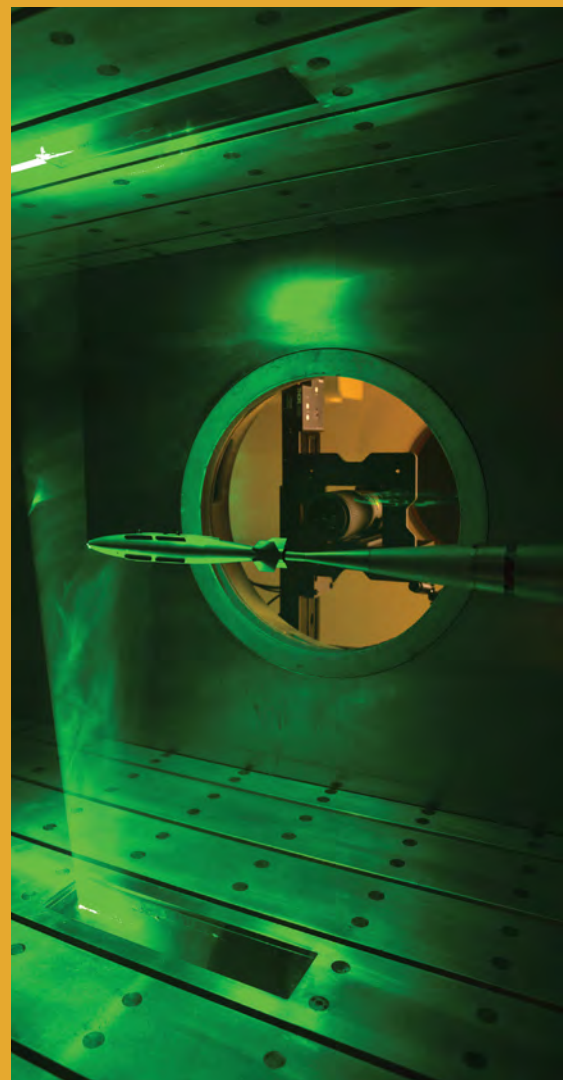
In the context of the transonic wind tunnel, which has most often been used to measure forces and moments for stores release analysis, PIV unlocks new insights into flow physics for stores in the transonic regime (Mach 0.3 to 1.4) and serves as a direct comparison and validation point for computational fluid dynamics simulations.

Integration of the PIV instrumentation with the TWS will provide invaluable flow-field data to validate computational simulations and directly support Aircraft Stores Compatibility qualification for RAAF and USAF F-35A Lightning II weapons integration.

*Paul Gulotta and Peter Manovski*



**RIGHT** The PIV laser sheet illuminating the GBU-31 model within the TWT test section. The PIV method enables tracking of small aerosol particles surrounding the GBU-31 model, revealing a 2D velocity field for an incoming flow at Mach 1.2 (or 372m/s). Photo: Sian Human, DSTG.







Carbon-fibre engine fairings.

# WHAT GOES AROUND...

SYDNEY UNIVERSITY RESEARCHERS HAVE DEVELOPED AN EFFECTIVE RECYCLING PROCESS FOR CARBON FIBRE.

**I**N RECENT YEARS there has been an increased focus on the circular economy (where waste resources are redeployed and reused) and a heightened demand for products made of recyclable materials. However, many materials can only be recycled so many times before they begin to wear out. That is the case with carbon-fibre-reinforced polymer (CFRP) composites, non-biodegradable materials which, until now, have lacked a viable recycling method.

CRFP composites are present in products such as wind turbines, aeroplane parts, cars, ships, laptops and mobile phones. They are typically disposed of in landfills or by incineration.

Most existing recycling methods cause a major reduction in the mechanical and physical properties of the recovered material, weakening its core functionality, but researchers from the University of Sydney's School of Civil Engineering have developed an efficient and cost-effective method to recycle CFRP composites while maintaining 90 percent of the material's original strength.

"We used a two-phased, optimised process," says the study's lead researcher Dr Ali Hadigheh. "The first step is called 'pyrolysis', which breaks down a material using heat, but significantly chars the materials which prevents it from developing a good bond with a resin matrix. The second process, oxidation, uses high temperatures to remove the char.

"Pyrolysis and oxidation alone are not

enough to preserve carbon fibres and these processes have existed for some time already. To ensure a high-quality recovery and economic efficiency, thermal decomposition of CFRPs need to be guided by analysing the energy required to initiate a chemical reaction in the composite, and separate carbon fibres from the surrounding resin matrix.

"What makes our method so successful is that we have added specific parameters – such as temperature, heating rate, atmosphere or time spent being oxidised and heated – that preserve the functionality of carbon fibre."

In 2010, the global production of fibre-reinforced polymers (FRP) was approximately six million tonnes with a projected growth of 300 percent in the next decade. With that projection, the consumption of FRPs will exceed 18 million tonnes by 2025, with an end-product value of \$80 billion.

"The 2016 Australian National Waste Report concludes that the use of composite materials is creating future challenges to recycling. Plainly put, if we do not develop efficient and cost-effective methods to recycle carbon fibre composites, we risk damaging the environment significantly," says Dr Hadigheh.

The United States, Japan and China lead the world in carbon fibre manufacturing. The University of Sydney researchers hope to increase the capacity of the Australian industry and work with manufacturers of wind turbines and commercial aircraft, as



**ABOVE** A RAAF Aircraft Structural Technician grinds the edges of a carbon-fibre composite mould for an aircraft repair. Photo: CPL David Cotton.

well as producers of sporting goods, and the construction, automotive and ship-building industries.

In summary:

- the process retains the properties of fibres at a higher rate than previous methods, demonstrating a retention strength of up to 90 percent
- recycled materials could be up to 70 percent cheaper and lead to a 90-95 percent reduction in CO2 emissions compared to standard manufacturing
- carbon fibre is lightweight and approximately six times stronger than steel, making it an ideal material for the manufacture of aircraft components. **W**

*The research was supported by the Australian Government through the Australian Research Council's Discovery Early Career Researcher Award fellowship scheme, received by Dr Hadigheh.*

# WHAT SUPER CHANGES MEAN FOR YOU

WHEN THE FEDERAL GOVERNMENT HANDED DOWN ITS 2021 BUDGET IT ANNOUNCED A RAFT OF CHANGES TO SUPERANNUATION.

## SUPER GUARANTEE INCREASE

The superannuation guarantee (SG) contribution increase won't affect current military members because their defined benefit schemes are not subject to SG contributions, and accumulation fund members, such as ADF Super members, are already receiving contributions equivalent to 16.4% of salary and allowances. However, for most other Australians, employer contributions increased from 9.5% to 10% of salary from 1 July 2021. Over the next few years, the plan is to gradually increase contributions to 12% per annum.

## CONCESSIONAL CONTRIBUTIONS

Concessional contributions include employer and salary sacrifice contributions. They are paid from pre-tax income and taxed at 15% by your super fund, a 'concessional' rate usually much lower than your marginal tax rate.

The annual concessional contribution limit increased from \$25,000 to \$27,500 on 1 July 2021, allowing you to boost your super balance tax effectively by an extra \$2,500 a year.

Defined benefit members can use the concessional contributions estimator on the Commonwealth Super Corporation website ([csc.gov.au](http://csc.gov.au)) to estimate your



notional defined benefit contribution amount that counts toward your concessional contribution cap.

## NON-CONCESSIONAL CONTRIBUTIONS

Non-concessional contributions include contributions made from after-tax money, such as the 5% mandatory contributions that MSBS members make, or voluntary contributions you make yourself. The non-concessional contribution limit increased to \$110,000 a year on 1 July 2021. This could be useful if you receive a windfall or sell an investment and want to make a large contribution to super.

A 'bring forward' rule allows most people to make up to three years' worth of non-concessional contributions in one hit.

## SUPER STAPLING

From 1 November 2021, if you have an accumulation super fund your current employer pays into, and you change employers, your new employer will have to pay into the same fund, unless you choose a different fund. The aim is to reduce the number of funds each person has and therefore reduce the amount of money lost in fees. It will not apply to defined benefit funds, such as DFRDB and MSBS. However, if you have ADF Super and leave Defence after at least one year of service,

your ADF Super fund can now go with you to your new employer.

## UNDERPERFORMING FUNDS

Reforms also include a provision to call out MySuper products (employer default funds) that generate returns less than a specified benchmark. Those funds will have to notify members of the fund's underperformance. If it happens two years in a row, the fund will not be able to accept new members.

If your super fund is underperforming, it might be time to look for a new fund. Investment returns will determine, in part, how well you live in retirement.

The Australian Taxation Office ([ato.gov.au](http://ato.gov.au)) has a new superannuation comparison tool which displays a table of funds ranked

by fees and net returns and allows you to compare up to four super products at a time. To access a personalised version of the tool, log in to ATO online services through the MyGov portal.

## SEEKING ADVICE

Superannuation is complex and made more so because the applicable laws change constantly. In addition, everyone's financial affairs are unique, so changing laws impact people in different ways. The information in this article is for general education only and is not personal financial advice.

Consider contacting your superannuation provider or a licensed financial adviser to discuss your options.

When deciding who to consult, it is important to understand how advisers are remunerated because it may influence their advice. There is some useful information about choosing a financial adviser at [moneysmart.gov.au](http://moneysmart.gov.au). The site also contains excellent independent general education about a wide range of financial issues, including superannuation.

*Air Commodore  
Robert M C Brown AM FCA  
Chair ADF Financial Services  
Consumer Centre*

WORDS Flying Officer (AAFC) Paul A Rosenzweig OAM



The morning flight line at Warwick Airfield.  
Photo: SQNLDR(AAFC) Russ Pyers.



**ABOVE** Gliding Course trainees at Balaklava Airfield, from left: CSGT Dominic Huntley; CSGT Mithusha Kulatunga; CSGT Branson Darch; CSGT Kshitij Sapdhare; CCPL Bella Wright; CCPL Tristan Hahn, with flying instructors FLTLT(AAFC) Kevin Lewis (front) and WOFF(AAFC) Steve Shuck CSC. Photo: FLTLT Sam Lacey.

# GLIDING ON

**ONGOING COVID RESTRICTIONS** have limited the regular activities of the Australian Air Force Cadets (AAFC), but subordinate units of the Gliding Training School proved quite innovative during the July holidays.

When **Bathurst Glider Training Flight's** planned gliding course was cancelled, 50 aviation trainees participated in an online gliding course. Squadron Leader (AAFC) Alana Tetley, Flight Commander of Bathurst Flight, said: "AAFC Gliding went into the cloud. The interaction from our students was incredible and the guest speakers were inspiring."

To encourage the cadets to put their best foot forward, their dedication, focus and interaction was judged by the instructors. The two best students were CDT Polly Grindrod, No.324 (City

of Randwick) Squadron (new trainee) and CCPL Jared Bignell, No.328 (City of Bathurst) Squadron (continuing trainee).

With the easing of restrictions in South Australia, a small group of aviation trainees were able to complete their first flights from Balaklava Airfield on Gliding Course 1/21 conducted by **Balaklava Glider Training Flight**.

Cadet Corporal Bella Wright (No.613 Squadron, RAAF Edinburgh) summed up the highlights of glider flying: "The thrill you get from the winch launch, and then you are in control of what happens next. I loved being able to control the aircraft and do turns."

Cadet Sergeant Mithusha Kulatunga (No.613 Squadron) observed: "I would have never thought that in a week I would go from enjoying AAFC Flying Pilot Experience activities to fully piloting a glider from take-off to landing."

**Warwick Glider Training Flight** ran its Gliding Course 2/21 out of Warwick Airfield, Queensland. Flight Commander, Flight Lieutenant (AAFC) Brie Russell said a new group of Cadets commenced their AAFC aviation pathway and three instructors upgraded their qualifications. In addition, continuing trainees Cadet



Corporal James Slade and Leading Cadet Angus Young made their first solo flights.

CCPL Slade, from No.212 (City of Redcliffe) Squadron at Kippa-Ring, Qld, said flying a glider was unlike anything else. "It's a totally different experience, requiring a different set of skills than you learn anywhere else."

LCDT Young, from No.203 Squadron based at Anglican Church Grammar School in East Brisbane, reflected on

his first solo flight: "When you sit in the cockpit, ready to take-off, and you realise it is just you. Everyone on the ground can wish you luck, but, in the end, it is just you and the glider".



LCDT Angus Young prepares for his first solo flight at Warwick Airfield. Photo: GPCAPT John Young.

# CADET Q + A PILOT

**CADET SERGEANT JOSH LAUNDRY** from No.229 Squadron, Yeppoon, Qld, made his first solo flight in the DG1000S glider during Warwick Glider Training Flight's 1/21 Gliding Course in April.

## DESCRIBE YOUR FIRST DG1000S FLIGHT

It was in December 2019, my first time ever being in a glider. I remember distinctly the moment we disconnected from the tow aircraft. It was strange, the thought

of not having an engine and being able to still gain altitude. It was a great feeling and something that has stuck in my brain. I was thrilled knowing I was in control of an aircraft that was travelling over 100kph and knowing that this was the beginning of my flying lessons.

## HOW WAS FLYING SOLO?

After talking to the pre-solo coordinator and telling him my plan for the flight, I started doing the pre-flight inspection, strapping on the parachute, and finally taking a seat in the glider.

I remember looking out to my left, seeing the ground crew signalling to the tow pilot that it was clear for take-off and realising I had achieved more than I had ever expected for the gliding course. After what felt like the shortest ground run in my life, the aircraft was up. After a few minutes on tow, I was at 3,000ft. I did my pre-release checks, pulled the release knob and was officially gliding. After a few minutes enjoying the views and trying to hunt for a thermal with no luck, I decided it was time to join the circuit and come in

for a landing. After landing, I had a feeling of accomplishment, knowing all the effort I'd put in had paid off. I have had six AAFC gliding instructors and I can't thank each of them enough for the time they put in to get me to this point.

## WHAT HAS THE AAFC TAUGHT YOU?

The biggest thing is how important teamwork is. Without everyone doing their job and working as a team to get things done as efficiently as possible, it can fall apart.



Cadet Sergeant Josh Laundry from No.229 Squadron, Yeppoon.



## SURPRISE VISIT FOR TRAINEES

**WHILE ON COURSE** at Warwick Airfield in the July holidays, aviation trainees had a surprise touch-and-go visit from a RAAF No.35 Squadron C27J Spartan. Two days later, the aircraft returned to make a full-stop landing, giving the Cadets a great opportunity to learn firsthand about career opportunities in the aerospace industry. Two of the aircrew were former cadets. Photo: SQNLDR(AAFC) Colin Wilson.

# BALAKLAVA STAFF ACHIEVEMENTS

**AS BALAKLAVA GLIDER TRAINING FLIGHT** has resumed flying operations, allowing No.6 Wing Cadets to achieve, the flight's staff have also accumulated several notable achievements.

Flight Commander of Balaklava Flight, Ian Wright, has been promoted to Flight Lieutenant (AAFC). Ian served as a member of the Permanent Air Force from 1981 to 1998, earning the Australian Service Medal with clasp "SE ASIA" and Defence Force Service Medal.

Deputy Flight Commander, Flying Officer (AAFC) Paul Rosenzweig, was awarded the AAFC Five Years' Service Certificate. Paul served with the Australian Army from 1979 to 2011 and has served as an instructor with the Army Cadets in Adelaide (1983), Mackay (1987-89) and Darwin (1990-91).

Flight Lieutenant (AAFC) Neil Martin and Corporal (AAFC) Phyll Martin each received the Australian Cadet Forces Service Medal, and Flight Lieutenant (AAFC) Ian Harlow, who first joined the Air Training Corps in July 1989 as a civilian instructor with No.10 Flight at Warradale, received his second clasp. Flight Lieutenant (AAFC) Kevin Lewis was presented with the fifth clasp to his Australian Cadet Forces Service Medal (and Federation Star for the service ribbon), representing a total of 40 years' service.



**ABOVE** FLTLT(AAFC) Ian Wright (left) presents the AAFC Five Years' Service Certificate to FLGOFF(AAFC) Paul Rosenzweig. Photo: FLTLT(AAFC) Kevin Lewis.



## DONATE TO WINGS

If you enjoyed our latest issue please consider a donation to help cover the cost of production and contribute to our work with military Veterans. Follow the Donate link at [wingsmagazine.org](http://wingsmagazine.org)

*Wings* is a product of the Air Force Association a charitable, ex-service organisation supporting military Veterans.



AIR FORCE ASSOCIATION

# FROM TIGER MOTH TO AIRBUS

AS THE AUSTRALIAN AIR LEAGUE HAS BEEN CONFINED TO BARRACKS BY COVID RESTRICTIONS, WE REFLECT ON THE LIFE OF AN EARLY CADET.



**J**OHN ROSENBERG WAS born on 11 February 1924, the eldest of nine children, and attended St Columba's Christian Brothers School at Albion, Qld. Leaving school early, he got a job in the

Main Roads Office and worked hard to complete his apprenticeship as a draftsman.

He also became involved in the Australian Air League (AAL) with his father and young brother, Ean, joining the City of Brisbane Company which was part of the South Brisbane Division of Queensland Wing (units weren't known as squadrons until 1956). Standing Order No.32, 1939, records J. Rosenberg and E. Rosenberg being promoted to Acting Flight Commander (the equivalent of today's Corporal) effective 1 September 1939.

Working as a draftsman, John developed remarkable skills with his hands and carried those skills into his aviation career following enlistment with the RAAF as an airman on 26 April 1942, at the age of 18.

To satisfy a desperate need for aircrew for the war effort, the RAAF established 12 Elementary Flying Training Schools (EFTS) as part of the Empire Air Training Scheme. Recruits received up to 75 hours of basic aviation instruction on trainers such as the DH82 Tiger Moth before undergoing more advanced training overseas.

John was stationed at No.8 EFTS, Narrandera, NSW, where he topped his initial and elementary training, working



hard to gain proficiency and skill. Upon graduation, he shipped out to Canada for advanced training before embarking to England and commission as a Pilot Officer in a bomber squadron.

Following a bombing stint in England, John was selected as one of four crews to deliver replacement Vickers Wellington bombers to North Africa. En route, the other three aircraft were shot down and John's crew was the only one to reach Casablanca on the west coast of Morocco. From there he was posted to 458 Squadron stationed at Bône in Algeria (today known as Annaba), where he continued to fly the Wellington. 458SQN had been deployed to Bône in October 1943 to conduct maritime operations and anti-submarine patrols.

It was a crucial location for the invasion of neighbouring Tunisia and had been the goal of the US and British Army in 1942, advancing eastward from Morocco, Oran and Algiers across North Africa.

By March the following year, the squadron was on the move again, to Alghero Airfield on the Italian island of Sardinia, from where it sank its first U-Boat.

John was also involved in testing aircraft in service. A page from his logbook shows the wide variety of aircraft he flew included trainers, fighters, transport aircraft, bombers and the Sunderland flying boat.

After completing his service in the



**ABOVE** Trainee airmen on the tarmac at No.8 EFTS Narrandera, 1941.



**LEFT** John as an 18-year-old trainee pilot at No.8 EFTS Narrandera.

Mediterranean, John was transferred back to No.38 Squadron in Australia which was transporting supplies and personnel between Australia and the front lines in New Guinea and Borneo, then regular courier flights between Australia and Japan following the Japanese surrender using Douglas C-47 Dakota aircraft.

## POST WAR

Discharged from the RAAF on 1 May 1948, John was snapped up by the fledgling airline Trans-Australia Airlines (TAA). The following year, Qantas transferred its Queensland network to TAA along with its services to the Queensland Flying Doctor Service and the Northern Territory Aerial Medical Service.

As a consequence, John spent his early days with TAA working with the Queensland Flying Doctor Service, flying the old Dragon and Drover aircraft. Nothing was too much for him – flies, heat or dust. One nursing sister at Birdsville remarked, "John would even

help peel potatoes in the kitchen while the flying doctor was delivering babies”.

He also saw no rivalries with other pilots or airlines. In December 1951, when a Cairns Ambulance plane went missing, the *Centralian Advocate* newspaper noted: “Captain John Rosenberg of TAA jumped into the cockpit of a DC3 at Cairns; took off to search the area. The plane belonged to arch-rival ANA!”.

## BABY ONBOARD!

On a hot summer’s day in 1948, John was flying a Douglas DC-3 from Darwin to Schofields, NSW, with passengers including patients from Japan where Australia was still involved in the British Commonwealth Occupation Force. Landing at Cloncurry, Qld, they were joined by young Red Cross Officer Elizabeth Houston from the 113th Australian General Hospital, who came aboard to look after the patients.

As the DC-3 bounced up and down in the heat near Julia Creek, one of the passengers went into labour. Elizabeth raced to the cockpit to announce, “Captain, we’re going to have a baby onboard!”. The race was on to get to their destination before the baby was born. For the young pilot with war experience it was just another challenge. The baby was born on the tarmac at Schofields.

John and Elizabeth met up again several months later and from then on John always made sure he was rostered for the Townsville to Mt Isa flight with a precision-timed 10-minute stopover in Richmond to meet with Elizabeth after she drove 73 miles just to see him. They were married in February 1951 and went on to have three children.

In his time with TAA, John was a training captain, check captain and flight captain. When not engaged in flying operations, he was caught up in administration. He was Flight Operations Superintendent in Papua-New Guinea and Senior Regional Captain in Queensland for over a decade. As a member of the Guild of Air Pilots and Air Navigators, John was a Liveryman, Upper Freeman and a Master Air Pilot at the Court of London.

## AIRBUS A300

John became a type-specialist on Boeing and Airbus aircraft, and helped introduce the Airbus to Australia, ferrying the second of five wide-bodied A300 Airbuses from Toulouse in France to Brisbane



**ABOVE** DHA-3 Drover VH-DRA, flown by John many times, Cairns airport, December 1950. Photo: Ben Dannecker collection, courtesy Geoff Goodall.




**LEFT** Armament personnel of No.458 Squadron RAAF loading bombs onto one of the squadron’s Vickers Wellington aircraft, Foggia, Italy, circa January 1944. Photo: Australian War Memorial.

Airport in 1981. Christened *John Oxley*, the plane joined TAA’s first Airbus, *James Cook*, on routes between Brisbane, Sydney, Melbourne and Perth.

Speaking to journalists at the time, John had nothing but praise for the wide-bodied jets. “I’ve flown everything from Tiger Moths to 727s,” he said. “The engine design of the two General Electric jets is a significant improvement as far as noise is concerned over the DC9s and the 727s.”

Sadly, a few years later John learned he had pancreatic cancer. He passed away on 5 November 1986.

Aviation and the RAAF must be a Rosenberg family tradition. Today, Jenni Rosenberg, grand-daughter of John’s brother Ean, is training to be a Weapons System Officer with the RAAF. 

*Compiled by Brian Grinter, with information provided by Sqn. Capt. Ean Rosenberg. Ean re-joined the AAL 1996 in Coffs Harbour, where he served as the Squadron Officer Commanding until 2021. Sadly, Ean passed away in August.*



**TOP** A typical courier flight operated by No.86 Wing to Japan in support of the British Commonwealth Occupation Force. Photo: R. Donaldson (Mitchell Library, State Library of NSW, courtesy ACP Magazines Ltd).

**ABOVE** TAA Airbus A300 *John Oxley*, Kingsford Smith Airport in 1982. Photo: David Tanner.

**AIR VICE-MARSHAL  
ALAN REED AO, US DFC**

16 December 1933 - 24 July 2021



**ALAN WAS BORN  
IN ALBANY,**

Western Australia in 1933 and grew up in East Fremantle, attending Fremantle Boys High School.

He applied for pilot training in the RAAF and was selected for No.13 Pilots Course at Archerfield, Queensland on Tiger Moths in May 1953. He was awarded his wings in July 1954.

Sergeant Pilot Reed was posted to fly long-nose Lincoln aircraft with No.10 Squadron in Townsville where he was subsequently commissioned, assessed as "above average" and made captain of his own crew.

Following a jet conversion on Vampires in 1958, he was posted to No.1 Squadron at Amberley flying Canberra aircraft. Alan participated in several overseas deployments including flying one of three Canberras around the world to participate in Nigerian Independence celebrations in October 1960.

A tour as a flight commander at the RAAF Academy followed and on completion of Staff College in 1966, Alan was promoted to squadron leader and selected for the first pick-up of the F-111 from the United States. During refresher training, he learnt he had been selected for exchange with the US Air Force to fly Phantom RF-4C in the reconnaissance role.

Alan's duty at Shaw Air Force Base was to train US pilots and navigators to fight in Vietnam. To gain combat experience, he applied for a posting to Vietnam flying Phantoms and was assigned to the 12th Tactical Reconnaissance Squadron at Tan Son Nhut base (Saigon) for a six-month temporary duty. He flew missions into North Vietnam and Laos.

He subsequently returned to Shaw to complete his instructional duties as a flight commander. For his service in Vietnam, he was awarded the US Forces Distinguished Flying Cross with Oak Leaf Cluster.

After returning to Australia in April

1970, he was appointed to command No.6 Squadron equipped with Phantoms, while the Air Force awaited the arrival of the F-111.

He attended Joint Service Staff College as a student, and then as an instructor. Promotion to group captain and a tour at Headquarters Support Command was followed in 1979 with a posting as Air Staff Officer at RAAF Amberley flying F-111 aircraft.

On promotion to Air Commodore, Alan was posted as Commandant of the RAAF Academy at Point Cook in 1982 and then did a tour as Air Attaché in Washington. His final posting on promotion to Air Vice Marshal in March 1987 was as Air Officer Commanding Support Command in Melbourne.

Alan was appointed an Officer in the Order of Australia in 1989. He retired from the RAAF in November 1990 and established his own consultancy business.

Having started his career on Tiger Moths, he enjoyed flying his restored Tiger which he recently donated to the Temora Air Museum.

Alan was a long-term member of Air Force Association (Vic) and a great supporter of Vietnam Veterans.

**WARRANT OFFICER  
JOHN LARSEN**

5 December 1935 - 20 July 2021



**BORN IN  
BRISBANE,**

John's education was completed at Ashfield Secondary Technical School after his family moved to Sydney. He left school at 15 and joined the

RAAF on 5 July 1954, aged 18.

John completed trade training and armament fitter training at the School of Technical Training RAAF Forrest Hill, Wagga prior to joining No.23 Squadron (City of Brisbane) on 25 May 1955 to work on Wirraways and Mustangs at RAAF Archerfield before the squadron was re-equipped with Vampires and moved to RAAF Amberley. A posting to RAAF

Darwin followed in November 1955 where his main task was to maintain air sea rescue aircraft. That task was interspersed with duty at Snake Creek ammunition dump, 160km south of Darwin. He turned 21 while at Darwin.

After 15 months in Darwin, John returned to Amberley before another posting to Wagga to complete Armament Fitters course in October 1957. Posted to No.2 Operational Conversion Unit (OCU), RAAF Williamtown, John was involved in readying the move of Nos 3 and 77 Squadrons, equipped with Sabres, along with No.478 Squadron to RAAF Butterworth during the Malayan Emergency.

Posted to No.78 Wing and No.3 Squadron in Butterworth in November 1958, John spent two years in Malaya before a brief posting to No.2 OCU, Williamtown, but not before participating in a guard of honour for the Sultan of Johore's state funeral. A six-year posting to No.1 Central Reserve, RAAF Kingswood, followed in 1962.

He returned to Williamtown as a Corporal at No.2 OCU and then to No.3 Squadron. Once again, it was a time of preparation for a move to Butterworth, that time with Mirage aircraft. Again, John was selected for ceremonial duty, and went to Paris to commemorate the 50th Anniversary of Armistice Day in 1968.

In February 1969, John returned to Butterworth with No.3 Squadron, spending most of his time on the flight line. A state of emergency was declared in May 1969 as civil unrest turned violent between the Chinese and Malay populations, a dangerous and demanding time. He was promoted to Sergeant in 1970.

On return to Australia in 1971, John was posted to No.1 OCU, Nos 2 and 478 Squadrons working on Canberra aircraft. He returned to Butterworth in 1975 for his third tour in Malaysia with No.3 Squadron. However, soon after arrival he was promoted to Flight Sergeant and moved to No.75 Squadron as SNCO of Armament Section.

Returning to Australia in March 1978, he was posted to Headquarters Support Command and although promoted to Warrant Officer, he elected to resign and left the Air Force on 2 December 1978.

John had an eventful 24-year career, and served during a period of significant change for the Air Force.



## AIR COMMODORE GRAHAM DYKE DFC

22 November 1935 - 25 September 2021



### AFTER A NOMADIC UPBRINGING,

Graham attended 'Churchie' Boys Grammar in Brisbane. He was dux of his year and was a member of the first-grade

rugby, cricket and rowing teams.

A member of the Air Training Corps, he was also awarded a flying scholarship. He enlisted in the Air Force in January 1954 joining the RAAF College. He opted to leave the college after a few months and transferred to No.19 Pilots Course.

Newly graduated Sergeant Dyke was posted to Amberley, Qld in August 1955 for Lincoln conversion before joining No.1 Squadron at RAF Tengah, Singapore, where he flew bombing missions against the communist terrorists in Malaya. Returning from Singapore, he was commissioned as a Pilot Officer and completed a Dakota conversion and specialist polar navigation training at the School of Air Navigation, RAAF East Sale, prior to joining the RAAF Antarctic Flight. Midway through the tour in Antarctica, his Dakota was blown 10km away in a blizzard and although relatively intact, it was unrepairable. One of his other duties was to manage the 35 huskies that supported the expedition. The cartographers named a peak, Mt Dyke, after him.

After a brief flying refresher at East Sale, Graham was posted to No.1 (Bomber) Operational Conversion Unit (OCU) in January 1962 and qualified on Canberra aircraft. Postings to Nos 1 and 6 Squadrons followed before he returned to Central Flying School to complete the Flying Instructors Course. He then spent three and a half years at No.1 Basic Flying Training School, teaching *ab initio* pilots to fly the Winjeel.

Training responsibilities not yet complete, Graham returned to No.1 OCU before being posted to No.2 Squadron at Phan Rang, Vietnam in October 1968.

Then a Squadron Leader and a Flight Commander, he flew bombing missions across the country. He was awarded the DFC and the US Air Medal for Valor for his actions in South Vietnam.

Graham returned to Amberley and No.1 OCU for a two-year posting. During the Air Force's Golden Jubilee in 1971, he was the Canberra display pilot for all the national displays.

A ground posting followed as a member of the Family Liaison Team tasked to tour all Air Force establishments, briefing every member on the soon-to-be-introduced Defence Force Retirement Death Benefit Scheme.

Graham attended RAAF Staff College in 1973 before returning to No.2 Squadron as Commanding Officer. Now a photo/survey/mapping unit, the squadron was widely dispersed and much of his time was spent at Biak Island, tasked with mapping Papua New Guinea (PNG).

From the jungles of PNG, he was posted as Defence Adviser in New Zealand with promotion to Group Captain, an appointment he held for five years.

In January 1981, he was appointed Officer Commanding East Sale where he had the opportunity to fly Macchi aircraft.

Promotion to Air Commodore followed with a posting as Director-General Manpower in Air Force Headquarters. After three years, Graham retired on 17 January 1986, having spent 32 years with the RAAF.

A change of direction saw Graham become a farmer in Sutton before returning to Canberra in 2000.

## GROUP CAPTAIN DENIS STUBBS ADC

18 September 1937 - 23 July 2021



### DENIS GREW UP IN LENA VALLEY,

Hobart and was educated at Hobart High School. He enlisted in the Air Force on 17 January 1955, joining No.8 Course at the RAAF

Academy. Appointed a senior cadet, he proved a most likeable leader, providing

support to fellow cadets in all manner of activities and was an active sportsman.

Following flying training, Denis served briefly in Nos 22 and 76 Squadrons, flying Vampire aircraft, before being posted to No.2 Operational Conversion Unit in 1960 for conversion onto Sabres, which he flew on postings to No.78 Wing in Butterworth, Malaysia, and No.79 Squadron in Ubon, Thailand.

On return to Australia, he was posted back to the Academy for two years. A series of short postings to Central Flying School, No.1 Basic Flying Training School, Headquarters Support Command and School of Languages then followed, before posting to the Royal Airforce Staff College, Bracknell, UK. While there, he was injured in a motor vehicle accident which led to his recategorisation from Pilot to Administrative Officer.

Although the RAAF lost a skilled pilot, it did not lose Denis' inquiring mind or his ability to think conceptually and apply this thought practically to improve organisational capabilities. Those qualities came to the fore while he was at Bracknell where, although sharing the course with 140 students from some 40 countries, he won the Brooke-Popham Essay prize for the best thesis on a defence-related theme – the only Australian ever to do so.

On return to Australia in 1974, Denis worked in Canberra and then as Commanding Officer Tasmanian Squadron Air Training Corps and Commanding Officer RAAF Support Unit Hobart. His long association with RAAF Staff College followed some years later. After time at Joint Services Staff College, in 1981 he was posted to RAAF Staff College to eventually become Director of Studies and help drive major change with a new, and successful, syllabus aimed at converting a training experience into a more self-directed learning experience.

On retirement from the RAAF, Denis continued to work at Staff College as a full-time civilian staff member and later part time helping assess essays and run the very popular Gathering of Eagles two-day seminars involving veterans from various wars and peacekeeping operations. With full-time retirement, he continued to live in Canberra until Parkinson's Disease forced him into a nursing home until his death in July.



REVIEW BY Bob Treloar

**LOVE DEATH CHARIOT OF FIRE**

By **WINSTON HIGGINS**  
*Brandt and Schlesinger, RRP \$29.95*

**LOVE DEATH CHARIOT OF FIRE** is a historical novel centred on the later life and death of Reginald Mitchell, designer and manufacturer of the Supermarine Spitfire.

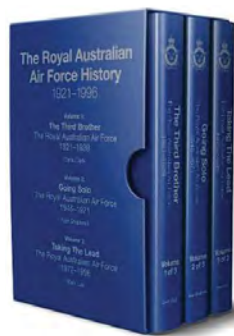
The Schneider Trophy International Seaplane race was more than a contest of speed, it provided a national prestige and world standing for the victorious country and the aircraft manufacturer, important during the nascent years of aviation in the 1920s and 30s. The Supermarine aircraft company won the trophy in 1927, 1929 and 1931, gaining considerable national prestige for Great Britain. It provided the incentive to keep the government and the RAF engaged in the pioneering of high-speed flight, the outcome of which was the development of an aircraft that would play a major part in winning the Battle of Britain.

The rise of fascism and the Nazi Party in Europe, the downturn of the British economy and the adoption of an attitude of appeasement by the government along with the declining health of Mitchell, diagnosed with a terminal illness, provide the backdrop to the story of the design and development of the Spitfire.

A modest, decent man with a gift for designing fast aeroplanes, Mitchell's commitment and intuition changed the outcome of the Battle of Britain. He was ably assisted by Beverley Shenstone, a Canadian-born aerodynamicist who shaped the aircraft's wings, and a team of engineers and mechanics.

Winton Higgins presents the key personalities who were part of the Supermarine team and explores details of the significant events as he believes they unfolded.

*Love Death Chariot of Fire*, woven around Mitchell's personality and his stoic battle with a terminal illness, is told with imagination and compassion, and has a general appeal.



REVIEW BY Michael Nelmes

**THE ROYAL AUSTRALIAN AIR FORCE HISTORY: 1921-1996**

By **DR CHRIS CLARK, DR ALAN STEPHENS & DR MARK LAX**  
*Big Sky Publishing, RRP \$69.99*

**IN THE RAAF CENTENARY YEAR**, it is timely that Air Force History and Heritage Branch has published a smart, three-book box set to bring together the three official histories produced by the RAAF over the past two decades. Three distinct periods of its history since its inception in 1921 are covered, totalling 1,600 pages.

*The Third Brother* by Dr Chris Clark (1991) explores the story of the RAAF in its formative inter-war years from 1921 to 1939. The challenges confronted by the fledgling force in endeavouring to establish itself as the third service, at times in the face of opposition from the Army and Navy, are examined.

*Going Solo* by Dr Alan Stephens (1995) picks up the story of the RAAF in the post-war years from 1946 to 1971, starting with the mass demobilisation and severe reductions in resources. But the combination of Cold War tensions, Australia's commitments to the conflicts in Korea, Malaya, Indonesia and Vietnam, and the military-technological revolution epitomised by jet aircraft and missiles, dramatically reversed that attitude.

*Taking the Lead* by AIRCDRE Dr Mark Lax (2020) covers the period 1972 to 1996. He takes the reader through the RAAF's post-Vietnam era and what would be a decade of relative peace globally. The challenges to be faced by the RAAF however, would be driven by constant pressures for budgetary, workforce and organisational efficiencies.

World War II is not included in the box set. Four RAAF volumes of the WWII official histories were published in the 1950s/60s by the Australian War Memorial and can be download by chapters from [awm.gov.au/collection/C1417303](http://awm.gov.au/collection/C1417303).



REVIEW BY Alan Stephens

**ANZAC & AVIATOR:** The remarkable story of Sir Ross Smith and the 1919 England to Australia air race

By **MICHAEL MOLKENTIN**  
*Allen & Unwin, RRP \$32.99*

**FOR A BRIEF PERIOD**, Ross Smith was the most celebrated person in Australia and one of the most famous men in the world. His victory in the Great Air Race from England to Australia in November/December 1919 remains one of the most momentous achievements in aviation history.

As the Australian astronaut Andy Thomas writes in his foreword to this outstanding biography, Smith "was courageous. He was ambitious. He was skilled. He was visionary. He could be ruthless. He had the right stuff".

Like many World War I aviators, Smith came from the outback and began his military career as a digger at Gallipoli, where he experienced the best and the worst of that fearful campaign.

Transferring to the Australian Flying Corps, first as an observer and then as a pilot, he became an ace, flying alongside some of the great names in RAAF history, including Dicky Williams, Frank McNamara and L.J. Wackett, and was admired for his nonchalant bravery by the legendary Lawrence of Arabia.

The challenges Smith had to overcome to complete the first flight from the UK to Australia are difficult for a modern aviator to comprehend. Your reviewer is in awe of the planning, intellect and, above all, sheer skill involved.

Anyone who has travelled on an international airline in the 102 years since then has, in a sense, reflected Smith's legacy.

Awarded a knighthood, Smith became a hero to kings and presidents, and to the everyday Australian.

He died in an aircraft crash in April 1922 while preparing for a flight around the world.

This is a great Australian story and a great read. Don't miss it.

# UPLIFTING OPPORTUNITY

Every aspect of Astra Aerolab is designed to uplift performance. With outstanding integration of technology and lifestyle in an idyllic region, co-located with RAAF Base Williamtown and Newcastle Airport, this is a unique opportunity to join the world's leading defence, aerospace and innovation precinct.

Leasing  
opportunities  
now available.

Contact: Brook Grimmond  
+61 478 677 263  
[bgrimmond@newcastleairport.com.au](mailto:bgrimmond@newcastleairport.com.au)

Newcastle Airport,  
RAAF Base Williamtown, NSW, Australia

 **ASTRA  
AEROLAB**

 **Newcastle  
Airport**

PIONEERS OF POWER



# Powering up for 100 years

We are immensely proud to have powered the Royal Australian Air Force continuously throughout its illustrious 100 year history. Our long relationship remains strong to this day, and we will continue to support the air men and women into the future. We have shared a century of innovation, partnering to break new ground in the field of aviation, and we are committed to continuing that pioneering spirit to enable future generations to reach for the skies.